APPENDIX D

Technical Scope of Work

Area of Investigation 1 - USOR Property

Remedial Investigation/Feasibility Study

US Oil Recovery Site

INTRODUCTION

This appendix to the Statement of Work (SOW) provides the preliminary technical Scope of Work for the Remedial Investigation/Feasibility Study (RI/FS) at Area of Investigation 1 ("AOI-1", also referred to as the "USOR Property" or "the property") at the US Oil Recovery Superfund site (the Site). The objective of the Scope of Work is to evaluate the nature and extent of contamination resulting from operations at the USOR Property, to obtain information necessary to fill data gaps in the Preliminary Conceptual Site Model (PCSM) for the USOR Property, and allow the development and evaluation of remedial action alternatives in the FS. The specific activities and procedures for implementing this RI/FS will be presented in subsequent work plans described in the SOW.

As described below, this scope of work is based upon the following analyses:

(1) Development of PCSMs for AOI-1 (human health and ecological), highlighting those potential exposure pathways and receptors for which additional data are needed to evaluate the completeness of a potential pathway and/or the significance of those pathways that are initially characterized as complete in support of the risk assessment.

(2) Design of an iterative RI characterization program and process that provides the needed data, including identification of media to be sampled, sample locations and associated analytical parameters.

(3) Identification of the data needed to complete the evaluation of potentially complete or potentially significant pathways in the PCSMs, and facilitate evaluation of potential remedial action alternatives in the FS.

Consistent with EPA's expectations as noted in Paragraph 2 of the SOW, an "iterative" approach to data collection will be used during the RI to maximize the overall investigative effectiveness and efficiency and assist in decision making. Also, consistent with the SOW and the Triad Approach, a streamlined data assessment and reporting process is proposed for the RI/FS. The iterative sampling program will start with the investigation of on-property (defined as the area inside the existing fence at the USOR Property) soil, groundwater, surface water and sediment and off-property (defined as the area outside of the existing fence at the USOR Property) soil and groundwater and proceed to off-property sediment, surface water, and other environmental media as appropriate. This iterative program will use the data collected in previous phase(s) of investigation to help focus constituents of potential concern (COPCs) and investigation areas for subsequent sampling efforts. It is believed that this approach will help minimize the likelihood of making erroneous decisions with data that are difficult to interpret, do not support the performance or acceptance criteria defined in the RI/FS Work Plan, or do not support the overall project goal of identifying potential risks associated with past AOI-1 activities.

PRELIMINARY CONCEPTUAL SITE MODELS

PCSMs are presented for human health and ecological pathways as Figures 1 and 2, respectively. PCSMs present the current understanding of the type and occurrence of potential contaminant sources and possible exposure pathways associated with AOI-1. Consistent with EPA RI/FS Guidance (EPA, 1988), the PCSMs were developed on the basis of existing AOI-1 conditions (i.e., land use, historical process knowledge, hydrogeology, source areas, COPCs, and existing data). The hypotheses presented in the PCSMs will be tested iteratively, refined, and modified as necessary as data are collected during the RI. The following subsections discuss AOI-1 conditions and available information that are important to understanding the overall PCSMs and remaining data needs.

Current Land Use

The USOR Property is located at 400 North Richey Street in Pasadena, Harris County, Texas, 77506 (Figure 3). The approximately 12.2 acre property was most recently used as a used oil processing and waste treatment facility by US Oil Recovery LP USOR LP). USOR LP began operations on the property in approximately June 2003 and acquired the property in December 2003. Prior to 2004, multiple businesses operated on the property including chemical manufacturing companies (specializing in fertilizers and/or herbicides/pesticides), a cow hide exporter, leather tanner, and companies with unknown operations including storage of various hard goods. Attachment D-1 contains a more detailed listing of the operational history of the property.

The USOR Property was abandoned by its current owner and is now under the custody and control of a court-appointed receiver. An office building, security guard shack, and large warehouse (approximately 25,000 square feet in size) are present on the property. The warehouse includes a former laboratory, machine shop, parts warehouse, and a material processing area that included a filter press. Approximately 800 55-gallon drums (some in over-packs) and 212 poly totes (300-400 gallons) containing various industrial wastes are present within the warehouse. A tank farm with approximately 24 aboveground storage tanks (ASTs) containing industrial wastes located within secondary containment is located on the north end of the warehouse. A large, concrete-walled aeration basin (also called the bioreactor) is located west of the tank farm. A containment pond is located west of the warehouse and south of the aeration basin. Approximately 225 roll-off boxes fitted with precipitation covers are located on the USOR Property. An inactive rail spur enters the south-central part of the USOR Property from the south and extends north along the west side of the warehouse. A utility right-of-way with various pipelines is present within the southern part of the USOR Property and pipelines are also present outside of the USOR Property along the eastern and western sides.

Currently, the USOR Property is enclosed within a six-foot chain link security fence with locked gates, security cameras have been installed, and access is monitored by a security contractor. The USOR Property was developed for industrial purposes in approximately 1947 and land use has remained industrial since that time. Land use in the vicinity of the USOR Property includes the following:

North: Undeveloped land that includes high-tension power lines, with Vince Bayou and a heavy industrial property located further north.
East: Undeveloped land that includes high-tension power lines, with (b) (6), Vince Bayou, and a heavy industrial property located further east.
South: An east-west oriented pipeline right-of-way is located along the southern boundary of the USOR Property with an east-west oriented railroad line, an additional east-west oriented pipeline right-of-way, and a heavy industrial property located further south.
West: A north-south pipeline right-of-way with undeveloped land, a City of Pasadena stormwater detention basin, and a heavy industrial property located further west.

Vince Bayou is located to the north and east of the USOR Property, is joined by Little Vince Bayou to the east of the USOR Property, and flows to the north and intersects with the east flowing Houston Ship Channel (HSC) approximately 0.4 miles north of the USOR Property. The closest residential land use is located approximately 0.08 miles (400 feet) south-southwest of the southwest corner of the USOR Property. The nearest public park (Light Company Park) is located approximately 0.24 miles (1,300 feet) south of the southern property boundary. The nearest school (Pasadena High School) is located approximately 0.5 miles southeast of the southern USOR Property boundary. The PCSMs are based on the premise that the USOR Property land use will remain commercial/industrial in the future. Documentation of future use restrictions as an industrial/commercial property will be provided in the

RI/FS Work Plan.

Topography

According to the Pasadena, Texas topographic map (USGS, 1982), the maximum elevation of AOI-1 is approximately 20 feet above mean sea level (msl) near the Containment Pond. The topography of the natural land surface generally slopes to the east and northeast towards Vince Bayou where the elevation is approximately sea level.

Geology

Based on the Geologic Atlas of Texas – Houston Sheet (BEG, 1982), subsurface soils at the USOR Property are underlain by the Beaumont Formation, which is comprised mostly of clay, silt, and sand and includes mainly stream channel, point-bar, natural levee, backswamp, and to a lesser extent coastal marsh and mud-flat deposits. The Beaumont Formation beneath the USOR Property is dominantly clay and mud of low permeability, high water-holding capacity, high compressibility, high to very high shrink-swell potential, poor drainage, level to depressed relief, low shear strength, and high plasticity.

Hydrogeology

The Gulf Coast Aquifer is a major aquifer underlying AOI-1 that consists of the Evangeline, Chicot and Jasper aquifers, which are composed of discontinuous sand, silt, clay, and gravel beds (TWDB, Report 380, July 2011). The apparent direction of groundwater flow in these units is to the southeast toward the Gulf of Mexico. In addition to the primary aquifers, groundwater often occurs in sand units in the shallow subsurface within the Beaumont Formation. These water-bearing units are not typically used for irrigation or drinking water due to relatively low yields or poor quality.

Limited previous subsurface investigations at the USOR Property have encountered silty clay, clay, silt and sand to a depth of approximately 25 feet below ground surface (bgs). Groundwater was observed at approximately 10 to 12 feet bgs during previous investigations. The apparent direction of groundwater flow at the USOR Property is to the northeast toward Vince Bayou.

Potential Source Areas and Chemicals of Potential Concern (COPCs)

The following potential source areas are present at AOI-1:

1) Drums
2) Aeration Basin (Bioreactor)
3) Sumps
4) Totes
5) Containment Pond
6) Aboveground Storage Tanks
7) Roll-off Boxes/Frac Tanks
8) Impacted Soil (including the former buried waste pit to the west of the warehouse that was identified in historical documents)
9) Unknown Subsurface Sources (Pits, Sumps, etc.)
10) Pipelines

Removal actions to address potential source areas 1-7 listed above are being developed/implemented pursuant to the Administrative Settlement Agreement and Order on Consent for a Time-Critical Removal Action dated August 25, 2011 (“Removal Action AOC”). Due to the nature of the removal actions and

the associated field work, there is the potential for interference with the performance of the activities described in this Scope of Work. Consequently, the Work Plan shall include a schedule that coordinates the activities described in this Scope of Work so as to avoid any potential interference.

Attachment D-1 provides for AOI-1: 1) general information, 2) ownership and operational history, 3) a list of historical releases taken from existing documents, 4) investigation history, 5) a list of historical removal and response actions, 6) potential impacts at off-property areas, and the rationale for sample locations at AOI-1 that are provided below in this document. Removal actions conducted by the PRP Group will be documented in separate reports to EPA and TCEQ pursuant to the Removal Action AOC. It should be noted that remedial actions may be necessary pending the outcome of the RI but, at this time, those actions have not been identified.

A preliminary list of COPCs has been developed based on historical data for hazardous substances present at the USOR Property, waste materials previously handled or currently present at the USOR Property, and analytical laboratory results of samples of environmental media collected from the USOR Property and nearby off-property areas. Samples were collected by EPA and TCEQ (or their contractors) during release response actions prior to July 2010 or stabilization activities conducted by EPA. Prior to July 2010, samples were collected during release-related response actions including samples of liquids leaking from containment vessels, ponded liquids, and/or impacted soil. After July 2010, liquid, sludge and solid samples were collected from drums, the bioreactor, sumps, poly totes, above-ground storage tanks, the containment pond, and roll-off boxes. Samples were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, and metals, and Total Petroleum Hydrocarbons (TPH). As summarized in the Hazard Ranking System (HRS) Documentation Record (EPA, 2011), VOCs, SVOCs, pesticides, metals, and TPH were detected in the samples and are attributed to the USOR Property. A review of past industrial operations at the USOR Property and the results of previous environmental investigations conducted at the USOR Property support the inclusion of VOCs, SVOCs, pesticides, herbicides, and metals on the initial list of COPCs for the RI. For example, metals (arsenic), pesticides and herbicides are included due to historic use of the property for the manufacture of arsenical pesticide products, and the blending and storage of pesticides and herbicides. The COPC list will be refined after each iteration of the RI/FS as USOR Property data are evaluated such that only those COPCs that originated at the USOR Property are moved forward, as described more fully below.

Possible Exposure Pathways

The human health and ecological PCSMs for the USOR Property (Figures 1 and 2) show the range of human health and ecological exposure pathways including the primary and secondary sources, the primary and secondary release mechanisms, the exposure media (i.e., soil, groundwater, surface water, sediment, air, etc.), and potential receptors. The processes or mechanisms by which receptors may reasonably come into contact with USOR Property-related COPCs are shown from left to right on the figure. Exposure pathways are dependent on current and future land use, which is expected to remain as an industrial land use. An exposure pathway is defined by four elements (U.S. EPA, 1989):

- A source material and mechanism of constituent release to the environment;
- An environmental migration or transport media (e.g., soil) for the released constituents;
- A point of contact with the media of interest; and
- An exposure route (e.g., ingestion) at the point of contact.

An exposure pathway is considered “complete” if all four elements are present.

Potentially complete human health exposure pathways are indicated with a “C” in the potential receptors column of Figure 1. Potentially complete pathways are assumed to be complete based on existing

information. Although a pathway may be preliminarily identified as potentially complete, additional data are often needed to confirm that the pathway is complete and evaluate the significance of the potentially complete pathway. The PCSM also identifies possibly complete pathways with a "P" in the potential receptors column of Figure 1. At this stage of the RI/FS, it is not known whether these media have been impacted by USOR Property-related activities. Information related to complete and potentially and possibly complete exposure pathways will be used to identify data gaps and help guide the data collection effort, ultimately ensuring that sufficient data are collected to facilitate quantitative evaluation of these pathways in the human health risk assessment. Pathways that are not viable are considered incomplete and are identified with an "I" in the potential receptors column on Figure 1, most often because the receptor will not contact the media specified.

Potentially complete ecological exposure pathways are indicated with a "C" in the potential receptors column of Figure 2. Potentially complete pathways are assumed to be complete based on existing information. Although a pathway may be preliminarily identified as potentially complete, additional data are often needed to confirm that the pathway is complete and evaluate the significance of the potentially complete pathway. The ecological PCSM also identifies potentially complete pathways for which potential exposures will be evaluated in an iterative manner with a "P" in the potential receptors column of Figure 2. At this stage of the RI/FS, it is not known whether these media have been impacted by USOR Property-related activities. Information related to complete and potentially complete exposure pathways will be used to identify data gaps and help guide the data collection effort, ultimately ensuring that sufficient data are collected to facilitate quantitative evaluation in the ecological risk assessment. Pathways that are not viable are considered incomplete and are identified with an "I" in the potential receptors column on Figure 2, most often because the receptor will not contact the media specified.

In the first iteration of data collection, data will be collected for the on-property media (i.e, soil, groundwater, surface water, and sediment) and off-property soil and groundwater using the initial list of COPCs. The results of the evaluation of the first iteration data will then be used to develop an investigative strategy for off-property sediment and surface water based on those compounds that were determined to have originated at the USOR Property. The specific mechanism/criteria for that determination will be developed in the RI/FS Work Plan. The second iteration of data collection will include sampling of surface water and sediment in drainage paths leading to Vince Bayou and from within Vince Bayou (and possibly Little Vince Bayou), with sample locations/collection details and analyte list developed based on data from the previous investigation iterations. Finally, based on the evaluation of all previously collected data, sampling of fish and/or shellfish in Vince Bayou (and possibly Little Vince Bayou) will be conducted during a third iteration, as necessary. It is envisioned that a streamlined data evaluation and reporting process will be used to move from iteration to iteration in the RI as efficiently as possible (see details in the RI/FS Data Collection Activities section below). After each data collection iteration during the RI, the PCSMs presented in Figures 1 and 2 will be updated and refined as necessary. The iterative approach to the investigation and the streamlined data evaluation and reporting process are described in greater detail in the following sections.

DATA NEEDS

Based on an evaluation of the exposure pathways identified in Figures 1 and 2, and an analysis of the information needed to assess the completeness of these pathways, the data needs listed in Table 1 were developed for the USOR Property. Table 1 illustrates the data needs development process by: (1) noting the PCSM exposure medium for exposure pathways that were not judged to be incomplete; (2) identifying the specific data needed to determine whether that pathway is potentially complete; (3) listing the existing data that were reviewed as part of RI/FS scoping; and (4) describing the RI activities, approaches, and data collection methods to be performed to fill the identified data need.

A list of general data needs is also included in Table 1 and includes supplemental information needed for the RI such as land use, quality of habitat, climate, subsurface migration pathways, etc.

FS data needs are not included in Table 1 at this time. As FS data needs are identified as the iterative RI/FS process proceeds, appropriate programs to fill these needs will be developed. The development and evaluation of remedial alternatives will be performed as specified in the RI/FS guidance. First, the risk assessment findings will be used to develop remedial action objectives. General response actions will be developed to address these objectives, and preliminary technologies/alternatives associated with those response actions will be screened. If at any time during this process a data need related to the FS is identified, a program to collect that data will be developed and implemented.

EXISTING DATA EVALUATION

As noted above, existing data were reviewed and used during development of the PCSMs and the data needs summary (Table 1).

Existing soil and groundwater data from the USOR Property were compiled into the tables listed below and attached to this Scope of Work. The soil data tables also contain any data from off-property areas that were investigated as a result of past releases from the USOR Property. Surface water and sediment data collected for EPA in 2011 (Weston Solutions, Inc., 2011) from Vince Bayou and Little Vince Bayou were also compiled since these data have been used by EPA to rank the Site using the HRS. All of the existing data are used for scoping purposes only and are not intended for use in risk assessment calculations or as the sole basis for evaluation of potential remedial alternatives in the FS. Sampling locations for the existing data shown in the tables are shown on Figures 4 and 5.

It should be noted that there are limited historic data for soil and groundwater at the USOR Property. Furthermore, much of the soil and groundwater data from historical documentation for the USOR Property are of limited value due to the fact that much of the data lack the required backup information such as sample location maps, quality assurance/quality control (QA/QC) data, and/or analytical method information. Also, the use of older data is limited due to changes in analytical methods, QA/QC procedures, etc. As such, some data from previous investigations at the USOR Property were not included in the summary tables for these and other reasons. Finally, laboratory qualifiers (flags) were not included for all data. Due to the range of different qualifiers used in the data packages, a consistent set of qualifiers was developed and used for the data summary tables.

The following data summary tables were compiled for AOI-1:

Table 2 - Metals Concentrations in Soil Samples
Table 3 – Volatile and Semi-Volatile Organic Compound Concentrations in Soil Samples
Table 4 – Pesticide Concentrations in Soil Samples
Table 5 – Metals and Pesticides Concentrations in Groundwater Samples
Table 6 – Metals Concentrations in Surface Water Samples – 2011 Data
Table 7 – Metals Concentrations in Sediment – 2011 Data
Table 8 – Volatile and Semi-Volatile Organic Compound Concentrations in Sediment – 2011 Data

DATA QUALITY OBJECTIVES

Data quality objectives (DQOs) (Table 9) are developed as part of the systematic planning process to define the type and quality of the data sufficient to characterize the USOR Property, conduct human health and ecological risk assessments, and perform the evaluation of remedial alternatives. The DQOs, therefore, support the rationale for the USOR Property investigation strategy and approach detailed in the following section. The data quality details of the DQO process will also be documented in the Quality Assurance Project Plan (QAPP) that will be developed with the RI/FS Work Plan.

The DQOs have been developed in general accordance with the "Guidance on Systematic Planning Using the Data Quality Objectives Process, EPA QA/G-4" (EPA, 2006). When data are collected during the RI/FS, the EPA-recommended systematic planning tool is the DQO process. The DQO process is a seven-step planning approach to develop sampling designs for data collection activities that support decision-making. The seven steps of the DQO process described by EPA are:

1. State the problem.
2. Identify the goal of the study.
3. Identify information inputs.
4. Define the boundaries of the study.
5. Develop the analytic approach.
6. Specify performance or acceptance criteria.
7. Develop the plan for obtaining data.

Steps 1 through 4 of the process are included in Table 9 and are discussed below. Steps 5 through 7 will be developed in the RI/FS Work Plan and QAPP since these steps are focused on detailed sampling and analytical processes and are not appropriate for this document. Some of the more important issues related to the DQOs are described in the following paragraphs.

Step 1: State the Problem

Historical USOR Property information suggests that contamination exists in on-property soil in areas of former operations, and that COPCs may have migrated off-property during unauthorized releases, spills and overland runoff following storm events. Previous sampling efforts, historical aerial photographs, relevant USOR Property information and reports have been thoroughly reviewed to better understand where COPCs may be on-property, what COPCs are potentially present, and what fate and transport of these COPCs may have occurred.

Because of the gradual topographic slope at the USOR Property, if COPCs were transported from the property, they would most migrate from the USOR Property to the east or north, deposit onto the surface soils in these areas and either remain in those soils or be transported further down-slope. Vince Bayou surface water and sediment would be the potential endpoint of transport and migration of USOR Property-related COPCs. Due to the highly industrialized nature of the surrounding area and the numerous possible point and non-point sources of COPCs in Vince Bayou and Little Vince Bayou unrelated to the USOR Property, it is difficult to identify the USOR Property-related COPCs without a thorough and complete understanding of on-property source characteristics and the transport/migration pathways off-property.

Develop the PCSM for the Area of Investigation

The PCSMs introduced above (Figures 1 and 2) convey what is known about the sources, releases, release mechanisms, contaminant fate and transport, exposure pathways, potential receptors and risks. The PCSMs were developed based on the review of relevant USOR Property information and with input from the PRP Group and EPA. Data collected during the RI/FS will be used to verify and revise the models as necessary. These DQOs were developed using the PCSMs.

Establish the Planning Team

The planning team is composed of project management and technical staff from EPA, TCEQ, identified Federal and State Natural Resource Trustees (Trustees), the PRP Group, and Pastor, Behling & Wheeler, LLC (PBW). The Project Team and organization will be described in the RI/FS Work Plan. The project management section of the RI/FS Work Plan will describe the decision-level authority and communication. Project management team members have been designated as members of the project decision-making team and as technical expertise support. Lines of communication are established between field staff, project management, the PRP Group, EPA, and other agency stakeholders to convey data from the field to decision makers and to convey decisions back to the field staff.

Identify Available Resources, Constraints and Deadlines

During the systematic planning, several critical field activities were identified. The outcome of these critical field activities may impact the scope and extent of other USOR Property investigation tasks. The critical field activities are the on-property surface and subsurface soil sampling, on-property sediment and surface water sampling, installation of monitoring wells on-property, and groundwater sampling from these monitoring wells. Based on the data obtained from the on-property field work, additional field activities will be undertaken in subsequent iterations. These subsequent iterations are anticipated to include the installation of additional monitoring wells on-property or off-property, groundwater sampling of these monitoring wells, off-property surface and/or subsurface soil sampling, and collection of background soil samples. Data obtained from these additional on-property and/or off-property sampling efforts will be used to focus subsequent off-property sediment and surface water (near the USOR Property and background), and potential fish and/or biota sampling investigation iterations.

Other practical constraints such as access and physical location that will affect characterization activities will need to be addressed. The presence of pipelines, utility easements and other AOI-1 features will be evaluated and sampling locations may change from the locations identified in this Scope of Work if necessary. The overall deliverable for the investigative activities at the USOR Property will be the RI/FS Report. However, several data assessment meetings (working meetings) will be held with EPA, TCEQ and Trustees stakeholders to review the RI data as it is collected and prior to conducting the next iteration of sampling, and develop work plan refinements as needed.

The available resources include the project management, technical staff, and drilling, and environmental laboratory contractors. Scheduling constraints of these personnel are not anticipated at this time. USOR Property characterization will be conducted in accordance with the Scope of Work provided herein and described in greater detail in the RI/FS Work Plan.

Step 2. Identify the Goal of the Study

The over-arching goals for the project are to characterize nature and extent of contamination associated with past USOR Property-related activities, demonstrate whether a COPC originated from the USOR Property, estimate potential human health and ecological risks from USOR Property-related COPCs, and design an effective remedial action plan for USOR Property-related impacts.

The review of historical data for the USOR Property was used in conjunction with the PCSMs to develop the data needs table shown in Table 1. This table was used to tie the potentially complete exposure pathways to the media of concern so that relevant USOR Property data could be collected to support the goals of the study.

At this point in the DQO process, the principal study questions, actions and decision statements are developed in a detailed manner for each media to be investigated. The result of these and subsequent steps of the DQO development process are presented in Table 9.

RI/FS DATA COLLECTION ACTIVITIES

The PCSMs, the conceptual descriptions of RI/FS activities in Table 1, and the DQOs were used to develop the initial RI/FS data collection activities and sample locations described below. Historical information (e.g., maps, aerial photographs, reports and other documentation) regarding potential source areas, property reconnaissance, and to a lesser degree the limited existing data, were used to guide the placement of initial investigation locations. Attachment D-1 provides a more detailed discussion of the rationale for each sample location for on-property media as well as off-property soil sample locations. These samples were selected in order to optimize the likelihood of detecting potential impacts from the USOR Property. Relative to a grid-based sampling program, these judgmental samples will likely overestimate potential risk but this type of sampling will provide a higher degree of confidence in evaluating whether the COPC originated at the USOR Property. The RI/FS Work Plan and RI Report will include information related to the sampling scheme and the adequacy of spatial coverage to satisfy project goals. The number of samples and sample locations ultimately needed to satisfy overall RI/FS objectives will be determined by the USOR Property conditions and the data obtained during the iterative phases of the RI/FS. However, consistent with the overarching objective of this scope of work, sample numbers/locations are proposed herein for the initial investigation phase (i.e., on-property soil, groundwater, surface water and sediment sampling and off-property soil and groundwater) to fill the identified data needs.

As noted previously and as illustrated by the PCSMs, data needs summary table (Table 1), and DQOs, investigation activities will initially focus on on-property environmental media (i.e., on-property soil, on-property groundwater, on-property surface water and on-property sediment) and off-property soil and groundwater. An iterative approach is proposed as the logical and effective and time-efficient manner for which the RI should be performed. This is due to the nature of the USOR Property where the source areas are located topographically higher than some of the potential receptors and potential impacts are primarily related to the movement of COPCs from the USOR Property to the receptors via surface drainage. Furthermore, receptors in Vince Bayou and Little Vince Bayou also are potentially impacted from the other documented industrial activities within the Vince Bayou and Little Vince Bayou watershed. In this regard, the determination of the impacts from the USOR Property, versus those from other sources of contaminants to Vince Bayou and Little Vince Bayou, must be carefully executed through the iterative progression of investigation activities beginning on the USOR Property and adjacent properties and working to Vince Bayou and including a comprehensive background study for media of

potential concern. This method will allow for the allocation of the relative contributions of COPCs to Vince Bayou and Little Vince Bayou among the multiple potential sources.

A data assessment meeting will be held after completing the data collection for each iteration to review the data, prior to proceeding with the next iteration of sampling. The iterative data collection program is described more fully below:

ITERATION	DESCRIPTION
1	AOI-1 on-property media (soil, groundwater, and surface water/sediment in the low-lying areas on the southwestern portion of AOI-1) and off-property soil and groundwater will be sampled and analyzed for the initial list of COPCs (metals, VOCs, SVOCs, pesticides, herbicides, and TPH) per the RI/FS Work Plan Sampling and Analysis Plan (SAP) and QAPP. After data validation, the sample concentrations will be compared to the screening criteria for that medium to be developed in the RI/FS Work Plan to determine whether the compound originated at the USOR Property. Data assessment tools (summary tables, maps, GIS data visualization, etc.) will be used to assist in making this determination. A working "data assessment" meeting will be held with the EPA, TCEQ and Trustees stakeholders where the data are reviewed and decisions are made regarding: 1) COPCs that will be carried forward and COPCs that can be eliminated from subsequent iterations of the RI/FS; and 2) locations of off-property surface water and sediment samples for the second iteration of the RI/FS. A Work Plan Refinement Notice (WRN) with the agreed-upon recommendations for the next iteration of sampling will be prepared for EPA approval. Upon receiving EPA approval, the specific activities proposed in the WRN will be initiated.
2	AOI-1 off-property surface water and sediment will be sampled and analyzed for the COPCs that were carried forward from the first iteration of sampling. After data validation, a working "data assessment" meeting will be held with the EPA, TCEQ and Trustees stakeholders where the data comparisons are reviewed and decisions are made regarding 1) COPCs that will be carried forward and COPCs that can be eliminated from subsequent iterations of the RI/FS based on whether that COPC originated at the USOR Property; 2) methods and locations for collection of fish and shellfish samples (if necessary) from Vince Bayou (and Little Vince Bayou, if needed) for the third iteration of the RI/FS; 3) other sampling and analytical considerations, etc. A WRN with the agreed-upon recommendations for the next iteration of sampling will be prepared for EPA approval. Upon receiving EPA approval, the specific activities proposed in the WRN will be initiated.
3	Prior to sampling fish and shellfish, sediment and surface water will be evaluated to determine what COPCs should be included in the fish/shellfish sampling program per recommendations and procedures identified in TCEQ, 2002, which is largely based on EPA procedures for evaluating potential impacts from the fish ingestion pathway when establishing surface water quality standards. Fish and shellfish will be sampled and analyzed for the COPCs that were carried forward from the second iteration of sampling. After data validation, the sample concentrations will be compared to the screening criteria for that medium to be developed in the RI/FS Work Plan or subsequently. A working "data assessment" meeting will be held with the EPA, TCEQ and Trustees stakeholders where the data comparisons are reviewed and decisions are made regarding the need for subsequent sampling for any media.

Given that the number of samples, the locations of the samples, and analytes to be measured in the samples for the off-property sediment, surface water, and biota cannot be determined until after the on-property media and off-property soil and groundwater data are evaluated, locations for off-property sediment, surface water and biota sampling activities that are described in the following sections and presented on the attached maps are subject to change. Detailed descriptions of the RI data collection activities will initially be provided in the RI/FS Work Plan, the Field Sampling Plan (FSP) and the QAPP as specified in the SOW. These plans will include descriptions of data collection activities for all iterations of the RI/FS. In other words, even though a particular media will not be sampled in the first iteration of the RI/FS (e.g., off-property sediment), the proposed methods for collection of those particular media samples will be included in the RI/FS Work Plan. The specific locations, analytes, and other specific information required for data collection in iterations two and three will be provided in the WRNs.

A comprehensive soil, sediment, and surface water background study (and biota if necessary) will be conducted to provide information related to whether a COPC originated at the USOR Property. Detailed information related to this study will be provided in the RI/FS Work Plan after additional research of the surrounding area and discussion with EPA, TCEQ and Trustees stakeholders on appropriate background reference areas.

Additional information that becomes available before or during the RI/FS will be considered and the investigation plan updated, as appropriate (e.g., the addition of sampling locations at the location of a previously unknown release). Also, field observations made during the field investigation will be used to guide additional investigation efforts and/or sampling, as appropriate.

General Investigation Activities

As shown in the General Data Needs section of Table 1, general investigation activities will be conducted and are related to the 1) potential presence of threatened and endangered species in the USOR Property vicinity; 2) subsurface utilities present at the USOR Property and off-property areas; 3) erosion potential of soils; 4) climate; 5) zoning and land use; 6) location of the flood plain; 7) historic USOR Property ownership activities, deed records, restrictive covenants, or deed notices; and 8) presence of ecological habitat. In addition, a water well records search will be conducted to identify registered water wells located within ½-mile of the USOR Property. A walking survey of immediately adjacent properties will also be conducted to identify the potential presence of un-registered water wells.

Analytical Methods and Analytes

The historic USOR Property ownership, information about past releases and operations at the property, previous environmental sampling conducted to-date at the property, and waste sampling conducted during emergency response activities indicate that various metals, petroleum hydrocarbons, pesticides and herbicides, several VOCs and SVOCs have potentially impacted AOI-1. Based on the COPCs described above, samples for the first iteration of data collection will be analyzed using the methods listed in the following table:

COPC	ANALYTICAL METHOD	ANALYTES
VOCs	USEPA Method 8260B	Target Compound List (TCL)
SVOCs	USEPA Method 8270C	TCL
Metals	USEPA Methods 6010B/7471A	Toxic Analyte List (TAL)[1]

[1] Aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc.

Pesticides	USEPA Method 8081	TCL
Herbicides	USEPA Method 8151A	Per SW 846 Method
TPH	TX 1005	Per TX 1005 Method

Based on the information provided in the Evaluation of Analytical Data Collected for PCBs and Dioxins, dated November 19, 2013, these two classes of contaminants are not included in the list of COPCs for USOR Operations. However, if additional sources of PCBs and dioxins are discovered then this decision will be revisited.
The COPCs for off-property sediment, surface water and biota will be developed based on the results from the previous iterations of the investigation and whether the COPC was shown to originate at the USOR Property. Sample collection techniques, analytical method details, and other analyses that will be conducted on selected samples (e.g., total organic carbon, total dissolved solids, bulk density, grain size, etc.) will be described in detail in the FSP and QAPP to be submitted with the RI/FS Work Plan.

AOI-1 On-Property and Off-Property Soil Investigation

The AOI-1 on-property soil investigation will be performed as described in the following paragraphs:

Soil Borings

Proposed soil boring locations are shown on Figure 6. The locations of soil borings are based on review of historic documents, historic aerial photographs, and AOI-1 reconnaissance observations. More specifically, the locations coincide with one or more of the following:

1) Locations of past industrial activities (e.g., railroad spur, loading/unloading pads, former tanks, pipelines, etc.)
2) Locations of current industrial activities (roll-off boxes, bioreactor, etc.)
3) Areas of stressed vegetation;
4) Areas of disturbed soil (as suggested by historical aerial photographs and reconnaissance observations);
5) Locations of historical releases including those described in the HRS documentation and as summarized in Attachment D-1 to this Scope of Work;
6) Previous soil boring location indicating potential contamination;
7) Historic areas of stockpiled material based on aerial photographs; and
8) Areas that appear to receive drainage from USOR Property source areas.

Some of the off-property soil sample locations correspond to historic potential source areas (e.g., the bioreactor release location to the north of the USOR Property), areas of disturbed soil, or areas of stockpiled material. These locations and rationale for soil sample location are discussed in greater detail in Attachment D-1. Preliminary locations shown on Figure 6 are subject to revision based on the data and information collected during the investigation.

All soil borings will be advanced to the top of the uppermost water-bearing unit (anticipated to be approximately 10-15 feet below ground surface) for characterization of surface and subsurface soil and the collection of soil samples. Discrete soil samples will be collected for laboratory analysis of the initial list of COPCs (VOCs, SVOCs, metals, pesticides, herbicides, and TPH). Samples will be collected from the following intervals:

- Surface (0.0-0.5 ft. bgs);

- Shallow (0.5-5.0 ft. bgs) - actual sample interval will be selected from the 0.5-5.0 bgs interval based upon field conditions including visual evidence of contamination, organic vapor meter (OVM) measurements, etc. or from 4.0-5.0 bgs if no evidence of contamination is observed.
- Subsurface (greater than 5.0 ft.) – actual sample interval will be selected from the greater than 5.0 ft interval based upon field conditions including visual evidence of contamination, OVM measurements, etc. or from the one-foot interval above the saturated zone if no evidence of contamination is observed.

The specific sample intervals will depend on the location and purpose of the particular sample. At locations based on the presence of a current or historic source area or evidence of industrial activity (shown in red on Figure 6), samples will be collected from all three sample intervals listed above. At sample locations along drainage pathways (shown in blue on Figure 6), samples will be collected from the upper two intervals (surface soil, shallow soil).

Selected representative soil samples will be analyzed for potential fate and transport parameters (total organic carbon, bulk density, etc.). A detailed description of the program for soil sample analysis will be presented in the RI/FS Work Plan, the FSP, and the QAPP.

Given the characteristics of AOI-1 (i.e., unconsolidated sediments, shallow depth to groundwater, etc.), it is anticipated that soil sampling will be conducted using direct-push technology (DPT) (i.e., geoprobe).

During the soil investigation, an evaluation of AOI-1 characteristics (e.g., presence and quality of vegetative cover, soil type, etc.) will be performed to qualitatively evaluate the potential for erosion of soils.

The soil boring and the Groundwater High Resolution Site Characterization (HRSC) (EPA, 2003) program (see below) will be conducted prior to the investigations of the other on-property and off-property media. Data and observations from the soil sampling program may be used to revise the subsequent media investigations described in the following section. For example, if field observations during soil sampling activities indicate the presence of non-aqueous phase liquids (NAPL) at AOI-1, the locations and/or quantity of monitoring wells and/or the methods for well construction may be altered. Additional discussion of this issue and detailed procedures for the on-property and off-property sampling program will be presented in the RI/FS Work Plan, the FSP, and the QAPP.

AOI-1 On-Property and Off-Property Groundwater Investigation

As shown on Table 1, the AOI-1on-property and off-property groundwater investigation will be performed as described in the following paragraphs.

High-Resolution Site Characterization

Concepts of the HRSC will be incorporated into the on-property groundwater investigation, as appropriate based on AOI-1 conditions. Initially, a series of vertical subsurface profiles using cone penetrometer testing (CPT) and/or the rapid optical screening tool (ROST) will be conducted perpendicular to the direction of groundwater flow (presumed to be to the northeast toward Vince Bayou, based on previous investigations at AOI-1) (Figure 6). These profiles will allow for the collection of a large amount of subsurface data in a short period of time. The CPT/ROST locations will be advanced to the base of the uppermost water bearing unit. Although limited information is available on the subsurface stratigraphy, it is likely that the uppermost groundwater bearing unit is no deeper than 30 feet bgs. The maximum depth of the CPT/ROST investigations will be 50 feet. At most of the transect locations, only the CPT tool will be advanced to provide stratigraphic information (i.e., soil type – sand, silt, or clay). At locations in the

central part of the USOR Property around the warehouse, the CPT and ROST tool will be advanced. The ROST tool provides information on soil type and the potential presence of NAPL in soils. If evidence of significant contamination is observed at any location (e.g., the presence of NAPL), advancement of the CPT/ROST tool will be halted. If evidence of significant contamination is not observed, the CPT/ROST boring will continue until the base of the uppermost groundwater bearing unit.

The CPT/ROST borings will be ground-truthed using DPT soil borings. After review of the CPT/ROST data, DPT borings will be conducted at a subset of the CPT/ROST boring locations. For the DPT borings, soil will be collected for visual inspection for the entire length of the boring. Furthermore, the CPT/ROST borings will be completed prior to the on-property soil investigation described above. Information from the CPT/ROST borings may be used to revise the locations, sampling intervals, etc. for the on-property soil borings. Use of CPT/ROST is not currently proposed for the off-property groundwater investigation but could be added based on the CPT/ROST results from the on-property groundwater investigation.

Additional HRSC techniques will be evaluated as the investigation proceeds. For instance, the collection of depth-discrete groundwater samples using multi-level sampling tools may be proposed if distinct multiple groundwater bearing units are observed, or if the groundwater-bearing units are of significant thickness.

Information from the HRSC techniques, in conjunction with information from the monitoring wells (stratigraphy, water levels, etc.) will allow for assessment of the potential hydrogeologic connection between USOR Property groundwater and Vince Bayou.

Detailed procedures for the groundwater HRSC program will be provided in the RI/FS Work Plan, FSP, and QAPP.

Monitoring Well Installation and Groundwater Sampling

The on-property soil sampling and groundwater HRSC programs will be used to determine the locations for permanent groundwater monitoring wells to be installed in the uppermost groundwater bearing unit at AOI-1 (Figure 6). If possible, soil borings will be converted to permanent monitoring wells at the locations where soil boring and monitoring well locations are co-located (Figure 6).

After development, samples will be collected from the monitoring wells and analyzed for the initial list of COPCs. Samples from selected monitoring wells will be analyzed for general or natural attenuation parameters such as cations/anions, total dissolved solids (TDS), etc. Groundwater field parameters (temperature, specific conductance, pH, dissolved oxygen (DO), oxidation-reduction potential (ORP), etc.) will be measured during sample collection at all monitoring wells. Samples will be collected for total and dissolved concentrations of selected metals.

Groundwater sampling events will be conducted to assess seasonal variability (e.g., sample quarterly for a year, evaluate results, and then determine appropriate monitoring program frequency).

All wells will be surveyed by a professional land surveyor to determine spatial (X-Y) coordinates and the elevation above mean sea level of the top of the monitoring well casing (Z).

At a minimum, a water-level measurement will be recorded from each well prior to it being sampled. Separate water-level measurement events not associated with groundwater sampling may also be conducted. If NAPL is encountered, an in-well NAPL thickness measurement will be performed.

The results of the on-property groundwater investigation will be used to 1) determine the need for the investigation of deeper groundwater at AOI-1; and 2) guide off-property groundwater investigation activities. If necessary, these investigations will be conducted during the off-property soil investigation (i.e., the second iteration of investigation).

Detailed procedures for groundwater monitoring well installation and sampling will be provided in the RI/FS Work Plan, FSP, and QAPP.

Hydraulic Testing

Hydraulic testing (slug testing) will be conducted in selected wells to estimate the hydraulic conductivity of the groundwater bearing unit(s). These data will be used to establish groundwater classification (in conjunction with TDS concentrations), estimate groundwater flow velocities, contaminant transport, etc. Detailed procedures for hydraulic testing will be provided in the RI/FS Work Plan, FSP, and QAPP.

AOI-1 On-Property Sediment Investigation

Samples of sediment and will be collected from the two areas at the southwest portion of the USOR Property as noted on Figure 6. The samples will be analyzed for COPCs and other parameters such as TOC, grain size, etc. Sample collection methods will be described in the RI/FS Work Plan, FSP and QAPP.

AOI-1 On-Property Surface Water Investigation

Samples of surface water will be collected from the two areas at the southwest portion of AOI-1as noted on Figure 6 (if present). The samples will be analyzed for COPCs. For the metals, analysis will be conducted for total and/or dissolved concentrations depending on the specific COPC (and as designated by the ecological benchmark table). Collection of samples from these areas depends on conditions during the investigation since these areas likely do not always contain standing water. Sample collection methods will be described in the RI/FS Work Plan.

AOI-1 Off-Property Surface Water and Sediment Investigation

A program for the evaluation of COPCs from USOR Property-related activities in Vince Bayou (and possibly Little Vince Bayou) surface water and sediment will be developed in a WRN. As shown on Table 1, information on the watershed flow paths, surface water/sediment hydrodynamics, and other potential sources of COPCs to Vince Bayou and Little Vince Bayou will be reviewed during the development of this program. Surface water and sediment samples in Vince Bayou and Little Vince Bayou will be collected, as required, for analysis of COPCs retained from earlier iterations of the RI/FS.

USOR Property Fish/Shellfish Investigation

Sampling of fish, shellfish or other biota in Vince Bayou (and Little Vince Bayou) may be conducted if the results of previous RI/FS data collection iterations show that USOR Property-related COPCs are present in surface water and/or sediment at concentrations above screening levels or if bio-accumulative COPCs are present above applicable thresholds. A WRN will be developed that describes the appropriate species for sampling, the methods for sampling, the COPCs to be analyzed, etc.

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TABLES

TABLE 1
DATA NEEDS SUMMARY
USOR SUPERFUND SITE – USOR PROPERTY – AREA OF INVESTIGATION 1

PRELIMINARY CONCEPTUAL PROPERTY MODEL POTENTIAL EXPOSURE MEDIUM[(1)]	ITERATIVE DATA NEED	APPROACH TO FILL DATA NEED		
		EXISTING DATA REVIEWED	REMEDIAL INVESTIGATION ACTIVITY	REMEDIAL INVESTIGATION APPROACH AND DATA COLLECTION METHODS
On-Property Groundwater	1) AOI-1-specific hydrogeology (hydraulic gradient, hydraulic conductivity, hydrostratigraphy, lithology, etc.). 2) Nature and extent of COPC concentrations. 3) General groundwater chemistry at AOI-1 (salinity, cations/anions, groundwater classification, etc.). 4) Uses of groundwater at and in the vicinity of AOI-1. 5) Discharge of groundwater to surface water. 6) Potential for groundwater to contribute to vapor intrusion and ambient air. 7) Potential presence of other groundwater plumes in the area.	1) Existing hydrogeology data for AOI-1. 2) Area water well survey and use survey. 3) Historic groundwater concentration data. 4) Surrounding property groundwater quality data.	1) Evaluate AOI-1 hydrogeology. 2) Evaluate concentrations of COPCs in uppermost groundwater-bearing unit. 3) Perform more detailed water well and water use survey of area. 4) Perform a water well records search within ½-mile of AOI-1. Confirm that nearby properties are provided potable water from the local municipality. 5) Perform subsurface utility survey to identify obstructions for drilling program and preferential pathways for migration of COPCs. 6) Identify ongoing and/or historic spills/releases that have or have the potential to impact groundwater. 7) Evaluate potential for discharge of	1) Perform initial high-resolution property characterization (HRSC) using a combination of assessment methods (e.g., cone penetrometer testing, depth-discrete groundwater sampling of the uppermost groundwater unit, and traditional soil borings). 2) Install permanent groundwater monitoring wells at pre-selected locations based on results of review of initial property characterization results. Based on the results, refine the AOI-1 COPC list. 3) Measure general groundwater parameters (temperature, specific conductance, pH, dissolved oxygen (DO). oxidation-reduction potential (ORP), TDS, etc.). 4) Collect groundwater samples to characterize on-property groundwater and evaluate potential impacts from source areas. Assess the potential for off-property migration and vertical migration on-property, if needed. 5) Conduct groundwater sampling events to assess seasonal variability e.g., quarterly for a year, evaluate, then determine appropriate monitoring program). 6) Perform hydraulic testing (slug testing) in selected wells. This data will be used with TDS data to establish groundwater classification. 7) Evaluate total versus dissolved concentrations of metals in groundwater samples. 8) Perform a water well records search to identify registered water wells located within ½-mile of AOI-1. In addition, perform a walking survey of immediately adjacent properties to identify the potential presence of un-registered water wells. 9) Assess the hydrogeologic connection and the

TABLE 1
DATA NEEDS SUMMARY
USOR SUPERFUND SITE – USOR PROPERTY – AREA OF INVESTIGATION 1

PRELIMINARY CONCEPTUAL PROPERTY MODEL POTENTIAL EXPOSURE MEDIUM[(1)]	ITERATIVE DATA NEED	APPROACH TO FILL DATA NEED		
		EXISTING DATA REVIEWED	REMEDIAL INVESTIGATION ACTIVITY	REMEDIAL INVESTIGATION APPROACH AND DATA COLLECTION METHODS
			groundwater to surface water. 8) Evaluate groundwater data to assess possibility of vapor intrusion (model).	potential for discharge of groundwater to Vince Bayou through the evaluation of water levels and the development of hydrogeologic cross-sections.
On- and Off[(2)]-Property Soil	1) Nature and extent of COPC concentrations in soil. 2) Potential source areas (e.g., bioreactors, tank farm, roll off boxes, former buried waste pit, etc.). 3) Surface water drainage patterns. 4) General soil characteristics to evaluate impact on COPC mobilization and sequestration in soil.	1) Concentrations of COPCs in soil collected during various investigations at AOI-1, and correlation of existing soil data with potential sources (including historical sources).	1) Evaluate lateral and vertical extent of COPCs in samples of surface soil (0 to 0.5 ft bgs), shallow soils (0.5 to 5 ft bgs) and subsurface soil (greater than 5 ft bgs). 2) Collect general soil chemistry data (pH, TOC, grain size, etc.). 3) Evaluate topography and preferential surface water drainage pathways. 4) Identify ongoing and/or historic spills releases that have or have the potential to impact soil.	1) Use detailed topographic survey of AOI-1 and adjacent and contiguous off-property areas (to Vince Bayou) to identify drainage areas. 2) Advance soil borings to top of uppermost water-bearing unit to characterize surface and subsurface soil. 3) Collect discrete soil samples for laboratory analysis of COPCs. 4) Analyze selected representative samples for potential fate and transport parameters (total organic carbon, bulk density, etc.). 5) Evaluate property characteristics (e.g., presence and quality of vegetative cover, soil type, etc.) to qualitatively evaluate potential for erosion of soil. 6) Refine COPC list based on existing and newly-acquired data set.

TABLE 1
DATA NEEDS SUMMARY
USOR SUPERFUND SITE – USOR PROPERTY – AREA OF INVESTIGATION 1

PRELIMINARY CONCEPTUAL PROPERTY MODEL POTENTIAL EXPOSURE MEDIUM[(1)]	ITERATIVE DATA NEED	APPROACH TO FILL DATA NEED		
		EXISTING DATA REVIEWED	REMEDIAL INVESTIGATION ACTIVITY	REMEDIAL INVESTIGATION APPROACH AND DATA COLLECTION METHODS
On-Property Sediment (southeast areas of AOI-1 where surface water is present for the majority of the year)	1) Concentrations of COPCs in on-property sediment samples. 2) Nature of on-property sediment, i.e., is it beneath ponded rainwater or from other sources, is it ephemeral, etc.? 3) Adequacy of the habitat in the areas where sediment is present.	1) Source data (concentrations of COPCs, source type, etc.) 2) Historical information on releases from AOI-1. 3) Surface runoff patterns at AOI-1 to areas of standing water. 4) Concentrations of COPCs in on-property soil (no on-property sediment data are available).	1) Identify ongoing and/or historic spills/releases that have or have the potential to impact on-property sediment. 2) Collect sediment samples from areas of standing water on-property.	1) As appropriate based on the nature of the sediment at AOI-1, collect sediment samples for analysis of AOI-1 COPCs, organic carbon, grain size, etc.
On-Property Surface Water (southeast areas of AOI-1 where surface water is present for the majority of the year)	1) Concentrations of COPCs in on-property surface water samples. 2) Nature of the on-property surface water; i.e., is it ponded rainwater or from other sources, is it ephemeral, etc.?	1) Source data (concentrations of COPCs, source type, etc.) 2) Historical information on releases from AOI-1. 3) Surface runoff patterns at AOI-1 to areas of standing water. 4) Nature and extent of COPCs in on-property soil.	1) Identify ongoing and/or historic spills/releases that have or have the potential to impact on-property surface water. 2) Collect data necessary to characterize surface water flow regime and origin of standing water.	1) Perform detailed topographic survey to indicate where standing water will collect on-property. 2) As appropriate based on the nature of the surface water, collect surface water samples from standing water for analysis of COPCs. For metals, analysis will be conducted for total and/or dissolved concentrations depending on the COPC (and as designated by eco benchmark table).

TABLE 1
DATA NEEDS SUMMARY
USOR SUPERFUND SITE – USOR PROPERTY – AREA OF INVESTIGATION 1

PRELIMINARY CONCEPTUAL PROPERTY MODEL POTENTIAL EXPOSURE MEDIUM[(1)]	ITERATIVE DATA NEED	APPROACH TO FILL DATA NEED		
		EXISTING DATA REVIEWED	REMEDIAL INVESTIGATION ACTIVITY	REMEDIAL INVESTIGATION APPROACH AND DATA COLLECTION METHODS
On-Property Air	1) COPC concentrations in on-property air (derived from COPCs concentrations in on-property soil).	1) Concentrations of COPCs in on-property soil collected during various investigations at AOI-1. 2) Review of existing ambient air monitoring data for area, if available.	1) Use on-property soil COPC concentration data to estimate and/or model potential emissions of volatile organic compounds and fugitive dust in on-property air.	1) Evaluate AOI-1 characteristics (e.g., presence and quality of vegetative cover, soil type, etc.). 2) Evaluate local meteorological data. 3) Estimate and/or model potential COPC concentrations in on-property air using on-property soil and groundwater COPC concentrations data and qualitative data described above.
Off-Property Air	1) COPC concentrations in off-property air (derived from COPCs concentrations in off-property soil)	1) Concentrations of COPCs in off-property soil collected during various investigations at the Property. 2) Review of existing ambient air monitoring data for property area, if available.	1) Use off-property soil COPC concentration data to estimate and/or model potential emissions of volatile organic compounds and fugitive dust in off-property air.	1) Evaluate off-property characteristics (e.g., presence and quality of vegetative cover, soil type, etc.). 2) Evaluate local meteorological data. 3) Estimate and/or model potential COPC concentrations in off-property air using off-property soil COPC concentrations data and qualitative data described above.

TABLE 1
DATA NEEDS SUMMARY
USOR SUPERFUND SITE – USOR PROPERTY – AREA OF INVESTIGATION 1

PRELIMINARY CONCEPTUAL PROPERTY MODEL POTENTIAL EXPOSURE MEDIUM[1]	ITERATIVE DATA NEED	APPROACH TO FILL DATA NEED		
		EXISTING DATA REVIEWED	REMEDIAL INVESTIGATION ACTIVITY	REMEDIAL INVESTIGATION APPROACH AND DATA COLLECTION METHODS
Off-Property Surface Water [2]	1) Presence of surface water and associated uses. 2) Watershed sub-basin. 3) Commercial, industrial, and municipal activities located along Vince Bayou and Little Vince Bayou (up-stream of AOI-1), including the identification of permitted outfalls. 4) Documented "spills/ releases" within the watershed sub-basin that had and/or continue to have the potential to impact surface water at AOI-1. 5) Surface water flow characteristics. 6) Background concentrations of COPCs in Vince Bayou and Little Vince Bayou surface water. 7) Concentrations of COPCs in surface water samples attributable to AOI-1 sources.	1) Source data (concentrations of COPCs, source type, etc.). 2) Historical information on releases from AOI-1 to soil and surface water. 3) Surface water drainage patterns at AOI-1 to off-property areas, extending to Vince Bayou and Little Vince Bayou. 4) Nature and extent of COPCs in on-property and off-property soil. 5) COPC concentration data from samples of surface water. 6) Surface water advisories and associated data.	1) Delineate the boundary and drainage within the watershed sub-basin. 2) Identify potential land use practices that might have impacted surface water adjacent to AOI-1. 3) Identify on-going and/or historic spills/releases that have or have the potential to impact surface water. 4) Collect data to characterize surface water flow regime (e.g., flow velocity, groundwater to surface water interactions, etc.). 5) Evaluate the surface water quality and the potential presence of COPCs in surface water.	1) Obtain information from the USGS and other local sources to define the extent and flow paths within the watershed sub-basin. 2) Perform an area reconnaissance to identify properties located within the watershed sub-basin that have the potential to impact the surface water system. After facility identification, obtain regulatory information from public sources to confirm facility operations. 3) Perform a regulatory database search to identify spills and/or releases that have occurred within the watershed that reached or had the potential to reach Vince Bayou or Little Vince Bayou. 4) Obtain publically available information on the physical flow properties of Vince Bayou and Little Vince Bayou (e.g., under normal and storm events). 5) Collect surface water samples in Vince Bayou and Little Vince Bayou for analysis of water quality parameters and COPCs. As part of this assessment, address total versus dissolved COPC concentrations, designed to address ecological benchmark criteria. 6) Evaluate Vince Bayou and Little Vince Bayou surface water sample COPC data relative to background COPC data for surface water samples collected in Little Vince Bayou as well as upstream in Vince Bayou.

TABLE 1
DATA NEEDS SUMMARY
USOR SUPERFUND SITE – USOR PROPERTY – AREA OF INVESTIGATION 1

PRELIMINARY CONCEPTUAL PROPERTY MODEL POTENTIAL EXPOSURE MEDIUM[1]	ITERATIVE DATA NEED	APPROACH TO FILL DATA NEED		
		EXISTING DATA REVIEWED	REMEDIAL INVESTIGATION ACTIVITY	REMEDIAL INVESTIGATION APPROACH AND DATA COLLECTION METHODS
Off-Property Sediment [2]	1) Sediment and surface water hydrodynamics in Vince and Little Vince Bayou. 2) Background concentrations of COPCs in Vince Bayou and Little Vince Bayou sediment. 3) Concentrations of COPCs in sediment samples attributable to potential AOI-1 sources.	1) Source data (concentrations of COPCs, source type, etc.). 2) Historical information on releases from AOI-1. 3) Surface water drainage patterns from property extending to Vince Bayou and Little Vince Bayou. 4) Nature and extent of COPCs in on-property and off-property soil. 5) COPC concentration data from historic sediment samples.	1) Identify ongoing and/or historic spills/releases that have or have the potential to impact off-property sediment. 2) Collect data necessary to characterize sediment regime (sediment thickness, depositional patterns, TOC, grain size, etc.). 3) If necessary based on iterative approach to characterization, collect samples of sediment for analysis of AOI-1 COPCs.	1) Refine AOI-1 COPC list by evaluating source area, soil and groundwater sample data. 2) Collect sediment samples in Vince Bayou and Little Vince Bayou for analysis of AOI-1 COPCs, if warranted. 3) Evaluate potential for AOI-1 to contribute COPCs to sediment in Vince Bayou above background levels collected in Little Vince Bayou and upstream in Vince Bayou. 4) Evaluate general chemistry of sediment (pH, TOC, grain size, organic carbon, etc.) in all samples.

TABLE 1
DATA NEEDS SUMMARY
USOR SUPERFUND SITE – USOR PROPERTY – AREA OF INVESTIGATION 1

PRELIMINARY CONCEPTUAL PROPERTY MODEL POTENTIAL EXPOSURE MEDIUM[1]	ITERATIVE DATA NEED	APPROACH TO FILL DATA NEED		
		EXISTING DATA REVIEWED	REMEDIAL INVESTIGATION ACTIVITY	REMEDIAL INVESTIGATION APPROACH AND DATA COLLECTION METHODS
Fish/Shellfish [2]	1) Identify fish/shellfish species present and affinity for Vince Bayou and Little Vince Bayou near AOI-1. 2) Concentrations of COPCs in fish/shellfish tissue attributable to AOI-1 sources. 3) Assess the potential for fish/shellfish consumption in the area.	1) Source data (concentrations of COPCs, source type, etc.). 2) Historical information on releases from AOI-1. 3) Surface runoff patterns at AOI-1 to off-property areas, including surface water. 4) Nature and extent of COPCs in on-property and off-property soil. 5) COPC concentration data from samples of surface water, sediment and fish/shellfish. 6) Fish/shellfish advisories and associated data. 7) Other data from trustees.	1) Identify ongoing and/or historic spills/releases that have or have the potential to impact fish/shellfish. 2) Collect data necessary to characterize aquatic conditions relative to fish in Vince Bayou and Little Vince Bayou (e.g., fish/shellfish species present, property fidelity, prey items, etc.). 3) If necessary based on iterative approach to characterization, collect fish/shellfish samples for analysis of AOI-1 COPCs.	1) Refine property COPC list by evaluating source area, soil and groundwater sample data. 2) Identify fish/shellfish species present and affinity for property. 3) Collect fish/shellfish samples in Vince Bayou and Little Vince Bayou for analysis of AOI-1 COPCs, if warranted. 4) Evaluate potential for AOI-1 to contribute COPCs to fish/shellfish tissue in Vince Bayou above background concentrations measured in fish from Little Vince Bayou and upstream in Vince Bayou.

TABLE 1
DATA NEEDS SUMMARY
USOR SUPERFUND SITE – USOR PROPERTY – AREA OF INVESTIGATION 1

PRELIMINARY CONCEPTUAL PROPERTY MODEL POTENTIAL EXPOSURE MEDIUM[(1)]	ITERATIVE DATA NEED	APPROACH TO FILL DATA NEED		
		EXISTING DATA REVIEWED	REMEDIAL INVESTIGATION ACTIVITY	REMEDIAL INVESTIGATION APPROACH AND DATA COLLECTION METHODS
General Data Needs	1) Collect qualitative data needed to support risk assessments such as the presence of T&E species, land use in the vicinity, receptor survey and use restrictions at AOI-1. 2) Identify potential preferential subsurface migration pathways. 3) Identify vegetative cover. 4) Identify climate patterns. 5) Identify land use within the watershed sub-basin. 6) Assess the potential for flooding. 7) Identify historic property ownership and use. 8) Assess the presence and quality of ecological habitat. 9) Identify any restrictive covenants on-property			1) Contact TPWD to determine potential presence of T&E species in the vicinity. 2) Contact the City of Pasadena Engineering Department to obtain a map of all subsurface utilities in the vicinity of AOI-1. In addition, contact the pipeline companies that operate subsurface pipelines in on-property and adjacent properties. 3) Assess the erosion potential of soils, which could create off-property impacts, extending to Vince Bayou. 4) Understand precipitation, prevailing wind direction, and assess how these parameters could impact mobilization of COPCs. 5) Obtain a current aerial photograph and access information from the City of Pasadena to obtain zoning information to define land use. 6) Obtain floodplain maps from FEMA to delineate the 100-year floodplain. 7) Establish historic property ownership and use through obtaining a chain-of-title and historic documents, extending back to a date, prior to property development. 8) Perform a reconnaissance and use public data to identify ecological habitats. 9) Evaluate property record to identify any restrictive covenants on-property.

See table notes on following page.

TABLE 1
DATA NEEDS SUMMARY
USOR SUPERFUND SITE – USOR PROPERTY – AREA OF INVESTIGATION 1

Notes:
1) Refer to Exposure Medium column on Figure 1 for human health receptors and on Figure 2 for ecological receptors.
2) Sampling of these media to be performed in conjunction with appropriate background sampling, if necessary.
3) Color coding per Figures 1 and 2, as follows:

Green – Primary media to be sampled during initial stage of RI/FS.
Blue – Second iteration media to be sampled based on primary media sample data.
Pink – Third iteration media to be sampled based on primary media and second iteration media sample data.
Yellow – For human health risk assessment, exposure medium concentration will be estimated using primary media sample concentrations.

Table 2 - USOR Area of Investigation 1
Metals Concentrations in Soil Samples

Location	Sample ID	Sample Date	Aluminum (mg/kg)	Antimony (mg/kg)	Arsenic (mg/kg)	Barium (mg/kg)	Beryllium (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Cobalt (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Manganese (mg/kg)	Mercury (mg/kg)	Nickel (mg/kg)	Selenium (mg/kg)	Silver (mg/kg)	Vanadium (mg/kg)	Zinc (mg/kg)
March 2011 EPA START-3 Sampling Event (HRS, p. 14, Reference 44)																			
SS-01	SS-01-03-51	03/01/11	11000	<1.5J	5.9J	117	<0.75J	<0.75J	15.2J	4.2J	19.3J	53.3J	83.4J	0.21	9.8J	<3.7	<0.75	17.1J	106J
SS-02	SS-02-03-51	03/01/11	21800	<1.3J	11.9J	198	<1.3J	<0.65J	17.2J	6.7J	9J	24.7J	345J	0.12J	12.3J	<6.5	<0.65	29.1J	25.5J
SS-03	SS-03-03-51	03/01/11	20800	<1.3J	205J	402	<3.3J	<0.67J	30.1J	19.1J	15.9J	38.3J	1170J	0.15	21.5J	<16.7	<0.67	48.3J	37.2J
SS-03	SS-03-03-52	03/01/11	18700	<1.3J	464J	718	<13.1J	<0.65J	40.8J	57.7J	<26.2J	58.1J	3600J	0.16	30.9J	<65.4	<0.65	65.9J	36.3J
SS-04	SS-04-03-51	03/01/11	8700	1.8J	10.5J	217	<0.83J	<0.83J	13.5J	3.8J	14.4J	37.3J	240J	<0.12J	8.9J	<4.2	<0.83	15.1J	129J
SS-05	SS-05-03-51	03/01/11	10200	<1.3J	2.1J	117	<0.66J	<0.66J	14.6J	4.3J	10.8J	55J	190J	0.083J	7.9J	<3.3	<0.66	16J	76.7J
2005 TCEQ Investigation (HRS, p.10) (USOR Preliminary Assessment Reference 25) (Sample locations uncertain but are from near the manhole and outfall at the southeast corner of OU-1)																			
T11590-1	T11590-1	10/7/05	---	---	29.3	---	---	---	34.9	---	22.7	36.9	---	0.43	19.6	---	---	---	312
T11590-2	T11590-2	10/7/05	---	---	115	---	---	---	---	---	---	30.7	---	0.09	16.3	---	---	---	203
T11590-3	T11590-3	10/7/05	---	---	55.3	---	---	---	---	---	---	27.0	---	0.14	---	---	---	---	122
T11590-4	T11590-4	10/7/05	---	---	66.5	---	---	---	31.0	---	26.7	68.9	---	0.35	18.3	---	---	---	574
T11591-1 (1A)	T11591-1 (1A)	10/7/05	---	---	46.3	720.0	---	---	47.4	---	49.2	40.8	---	0.20	27.0	---	---	---	489
T11591-2 (2A)	T11591-2 (2A)	10/7/05	---	---	43.4	577.0	---	---	35.8	---	44.5	48.8	---	0.18	26.1	---	---	---	668
T11591-3 (3A)	T11591-3 (3A)	10/7/05	---	---	66.6	1680.0	---	---	61.2	---	81.6	64.3	---	0.46	41.3	---	---	---	1010
USOR Letter to TNRCC (TCEQ) regarding remediation efforts related to spill from west side of bioreactor (HRS, p. 10, Reference 5, p. 504) (Preliminary Assessment Reference 30)																			
A1-1	A1-1	08/31/09	---	---	6.761	76.11	---	<0.5	7.029	---	---	13.63	---	0.068	---	<0.5	<0.5	---	---
A1-2	A1-2	08/31/09	---	---	7.614	57.26	---	<0.5	7.855	---	---	9.468	---	0.167	---	<0.5	<0.5	---	---
A1-3	A1-3	08/31/09	---	---	9.071	82.98	---	<0.5	32.88	---	---	12.88	---	0.127	---	<0.5	<0.5	---	---
A1-4	A1-4	08/31/09	---	---	28.71	67.02	---	0.66	7.964	---	---	12.35	---	0.604	---	<0.5	<0.5	---	---
A1-5	A1-5	08/31/09	---	---	6.34	58.72	---	<0.5	6.831	---	---	12.72	---	0.088	---	<0.5	<0.5	---	---
A1-6	A1-6	08/31/09	---	---	3.757	58.21	---	<0.5	5.08	---	---	8.191	---	0.03	---	<0.5	<0.5	---	---
A1-7	A1-7	08/31/09	---	---	0.917	151.7	---	<0.5	4.078	---	---	7.497	---	0.013	---	<0.5	<0.5	---	---
A1-8	A1-8	08/31/09	---	---	14.34	176.2	---	<0.5	6.747	---	---	15.47	---	0.304	---	<0.5	<0.5	---	---
A1-9	A1-9	08/31/09	---	---	2.135	214	---	<0.5	5.151	---	---	5.997	---	0.025	---	<0.5	<0.5	---	---
A1-10	A1-10	08/31/09	---	---	2.224	64.58	---	<0.5	14.44	---	---	12.74	---	0.033	---	<0.5	<0.5	---	---
A1-11	A1-11	08/31/09	---	---	1.621	202.9	---	<0.5	14.22	---	---	7.826	---	0.011	---	<0.5	<0.5	---	---
A1-12	A1-12	08/31/09	---	---	24.57	72.81	---	<0.5	9.942	---	---	75.9	---	0.165	---	<0.5	<0.5	---	---
A1-13	A1-13	08/31/09	---	---	54.7	196.3	---	<0.5	8.439	---	---	17.55	---	0.274	---	<0.5	<0.5	---	---
A1-14	A1-14	08/31/09	---	---	9.18	88.99	---	<0.5	8.36	---	---	38.46	---	0.302	---	<0.5	<0.5	---	---
A1-15	A1-15	08/31/09	---	---	9.947	75.52	---	<0.5	5.714	---	---	14.45	---	0.57	---	<0.5	<0.5	---	---
A1-16	A1-16	08/31/09	---	---	6.639	66.67	---	<0.5	4.696	---	---	8.191	---	0.236	---	<0.5	<0.5	---	---
A1-17	A1-17	08/31/09	---	---	2.381	59.49	---	<0.5	4.479	---	---	7.32	---	0.053	---	<0.5	<0.5	---	---
A1-19	A1-19	08/31/09	---	---	1.296	87.16	---	<0.5	15.63	---	---	13.72	---	0.015	---	<0.5	<0.5	---	---
A1-20	A1-20	08/31/09	---	---	1.536	139.8	---	<0.5	6.712	---	---	7.89	---	0.019	---	<0.5	<0.5	---	---
A1-4A	A1-4A	09/28/09	---	---	4.47	159.6	---	<0.5	9.06	---	---	2.75	---	<0.01	---	<0.5	<0.5	---	---
A1-8A	A1-8A	09/29/09	---	---	48	144.2	---	<0.5	10.8	---	---	4.88	---	0.055	---	<0.5	<0.5	---	---
A1-12A	A1-12A	09/30/09	---	---	28.7	73.5	---	<0.5	11.4	---	---	9.25	---	1.294	---	0.574	<0.5	---	---
A1-13A	A1-13A	10/01/09	---	---	22.6	75	---	<0.5	11.4	---	---	11	---	0.329	---	<0.5	<0.5	---	---
A1-14A	A1-14A	10/02/09	---	---	13.1	67.5	---	<0.5	8.67	---	---	5.09	---	<0.01	---	<0.5	<0.5	---	---

Table 2 - USOR Area of Investigation 1
Metals Concentrations in Soil Samples

Location	Sample ID	Sample Date	Aluminum (mg/kg)	Antimony (mg/kg)	Arsenic (mg/kg)	Barium (mg/kg)	Beryllium (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Cobalt (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Manganese (mg/kg)	Mercury (mg/kg)	Nickel (mg/kg)	Selenium (mg/kg)	Silver (mg/kg)	Vanadium (mg/kg)	Zinc (mg/kg)
2003 USOR Letter to TCEQ Regarding Remediation Efforts Related to "Buried Waste Pit" (Preliminary Assessment, Reference 23)																			
#1, #2, #3 Comp	#1	07/23/03	---	0.047	<0.005	1.76	<0.005	<0.004	<0.007	---	---	<0.01	---	<0.005	<0.015	0.021	<0.006	---	---
#1, #2, #3 Comp	#2	07/23/03	---	0.054	0.012	1.87	<0.005	<0.004	<0.007	---	---	<0.01	---	<0.005	<0.015	<0.005	<0.006	---	---
1991 Espey, Houston & Associates, Phase 2A Environmental Site Assessment (Preliminary Assessment, Ref. 19)																			
B-1 11-12'	B-1 11-12'	09/30/91	---	---	59.6	---	---	---	---	---	4.7	---	---	---	---	---	---	---	---
B-2 11-11.5'	B-2 11-11.5'	09/30/91	---	---	180	---	---	---	---	---	5.4	---	---	---	---	---	---	---	---
B-3 12.5-13'	B-3 12.5-13'	09/30/91	---	---	6120	---	---	---	---	---	3.9	---	---	---	---	---	---	---	---
1998 Extra Environmental Inc. Sampling Report for North American Hide Exporters																			
1	1	02/11/98	---	---	190	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2	2	02/11/98	---	---	120	---	---	---	---	---	---	---	---	---	---	---	---	---	---
3	3	02/11/98	---	---	<2.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---
4	4	02/11/98	---	---	95	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5	5	02/11/98	---	---	6.2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
6	6	02/11/98	---	---	180	---	---	---	---	---	---	---	---	---	---	---	---	---	---
7	7	02/11/98	---	---	20	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8	8	02/11/98	---	---	36	---	---	---	---	---	---	---	---	---	---	---	---	---	---
9	9	02/11/98	---	---	25	---	---	---	---	---	---	---	---	---	---	---	---	---	---
10	10	02/11/98	---	---	22	---	---	---	---	---	---	---	---	---	---	---	---	---	---
11	11	02/11/98	---	---	33	---	---	---	---	---	---	---	---	---	---	---	---	---	---
12	12	02/11/98	---	---	62	---	---	---	---	---	---	---	---	---	---	---	---	---	---
13	13	02/11/98	---	---	42	---	---	---	---	---	---	---	---	---	---	---	---	---	---
14	14	02/11/98	---	---	2.7	---	---	---	---	---	---	---	---	---	---	---	---	---	---
15	15	02/11/98	---	---	170	---	---	---	---	---	---	---	---	---	---	---	---	---	---
16	16	02/11/98	---	---	<2.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---
17	17	02/11/98	---	---	32	---	---	---	---	---	---	---	---	---	---	---	---	---	---
18	18	02/11/98	---	---	21	---	---	---	---	---	---	---	---	---	---	---	---	---	---
19	19	02/11/98	---	---	<2.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---
20	20	02/11/98	---	---	120	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Notes:
1. --- = No value available for that compound for that sample.
2. < = not detected above reporting limit
3. J = estimated concentration.
4. Not all qualifier flags from original data are included in this table.
5. Only metals detected in at least one soil sample are included in this table.

Table 3 - USOR Area of Investigation 1
Volatile and Semi-Volatile Organic Compound Concentrations in Soil Samples

Location	Sample ID	Sample Date	1,4-Dichlorobenzene (mg/kg)	Benzo (a) anthracene (mg/kg)	Benzo (a) pyrene (mg/kg)	Benzo (b) fluoranthene (mg/kg)	Benzo (g,h,i) perylene (mg/kg)	Benzo (k) fluoranthene (mg/kg)	Chrysene (mg/kg)	Di-n-butylphthalate (mg/kg)	Fluoranthene (mg/kg)	Indeno (1,2,3-cd) pyrene (mg/kg)	Methyl ethyl ketone (mg/kg)	Naphthalene (mg/kg)	Phenanthrene (mg/kg)	Pyrene (mg/kg)	Xylenes (mg/kg)
March 2011 EPA START-3 Sampling Event (HRS, p. 14, Reference 44)																	
SS-01	SS-01-03-51	3/1/2011	<0.0051	<0.767	1.32	1.68	1.36	0.98	1.31	<0.767	1.54	1.17	<0.0051	<0.307	0.425	1.56	<0.0051
SS-02	SS-02-03-51	3/1/2011	<0.005	<0.66	<0.66	<0.66	<0.66	<0.66	<0.66	<0.737	<0.264	<0.66	<0.005	<0.264	<0.264	<0.264	<0.005
SS-03	SS-03-03-51	3/1/2011	0.702	<0.652	<0.652	<0.652	<0.652	<0.652	<0.652	<0.652	<0.261	<0.652	<0.0057	<0.261	<0.261	<0.261	<0.0057
SS-03	SS-03-03-52	3/1/2011	0.986	<0.646	<0.646	<0.646	<0.646	<0.646	<0.646	<0.652	<0.258	<0.646	<0.0061	<0.258	<0.258	<0.258	<0.0057
SS-04	SS-04-03-51	3/1/2011	<0.0057	<0.784	<0.784	<0.784	<0.784	<0.784	<0.784	<0.784	0.668	<0.784	<0.0057	<0.313	<0.313	0.784	<0.0057
SS-05	SS-05-03-51	3/1/2011	<0.662	1.15	1.68	1.99	1.46	1.26	1.69	<0.662	2.64J	1.21	<0.005	<0.265	0.813J	2.66	<0.005
USOR Letter to TNRCC (TCEQ) regarding remediation efforts related to spill from west side of bioreactor (HRS, p. 10, Reference 5, p. 504) (Preliminary Assessment Reference 30)																	
A1-1	A1-1	8/31/2009	<0.005	<3.33	<3.33	<3.33	<4	<3.33	<3.33	<3.33	<3.33	<3.33	1.24	0.0059	<3.33	<3.33	<0.005
A1-2	A1-2	8/31/2009	<0.005	<3.33	<3.33	<3.33	<4	<3.33	<3.33	<3.33	<3.33	<3.33	<0.005	0.0074	<3.33	<3.33	<0.005
A1-3	A1-3	8/31/2009	<0.005	<3.33	<3.33	<3.33	<4	<3.33	<3.33	<3.33	<3.33	<3.33	<0.005	<0.005	<3.33	<3.33	<0.005
A1-4	A1-4	8/31/2009	<0.005	<3.33	<3.33	<3.33	<4	<3.33	<3.33	<3.33	<3.33	<3.33	<0.005	<0.005	<3.33	<3.33	<0.005
A1-5	A1-5	8/31/2009	<0.005	<3.33	<3.33	<3.33	<4	<3.33	<3.33	<3.33	<3.33	<3.33	<0.005	<0.005	<3.33	<3.33	<0.005
A1-6	A1-6	8/31/2009	<0.005	<3.33	<3.33	<3.33	<4	<3.33	<3.33	<3.33	<3.33	<3.33	<0.005	<0.005	<3.33	<3.33	<0.005
A1-7	A1-7	8/31/2009	<0.005	<3.33	<3.33	<3.33	<4	<3.33	<3.33	<3.33	<3.33	<3.33	<0.005	<0.005	<3.33	<3.33	<0.005
A1-8	A1-8	8/31/2009	<0.005	<3.33	<3.33	<3.33	<4	<3.33	<3.33	<3.33	<3.33	<3.33	<0.005	<0.005	<3.33	<3.33	<0.005
A1-9	A1-9	8/31/2009	<0.005	<3.33	<3.33	<3.33	<4	<3.33	<3.33	<3.33	<3.33	<3.33	<0.005	<0.005	<3.33	<3.33	<0.005
A1-10	A1-10	8/31/2009	<0.005	<3.33	<3.33	<3.33	<4	<3.33	<3.33	<3.33	<3.33	<3.33	<0.005	<0.005	<3.33	<3.33	<0.005
A1-11	A1-11	8/31/2009	<0.005	<3.33	<3.33	<3.33	<4	<3.33	<3.33	<3.33	<3.33	<3.33	<0.005	<0.005	<3.33	<3.33	<0.005
A1-12	A1-12	8/31/2009	<0.005	<3.33	<3.33	<3.33	<4	<3.33	<3.33	<3.33	<3.33	<3.33	<0.005	<0.005	<3.33	<3.33	<0.005
A1-13	A1-13	8/31/2009	<0.005	<3.33	<3.33	<3.33	<4	<3.33	<3.33	<3.33	<3.33	<3.33	<0.005	<0.005	<3.33	<3.33	<0.005
A1-14	A1-14	8/31/2009	<0.005	<3.33	<3.33	<3.33	<4	<3.33	<3.33	<3.33	<3.33	<3.33	<0.005	<0.005	<3.33	<3.33	<0.005
A1-15	A1-15	8/31/2009	<0.005	<3.33	<3.33	<3.33	<4	<3.33	<3.33	<3.33	<3.33	<3.33	<0.005	<0.005	<3.33	<3.33	<0.005
A1-16	A1-16	8/31/2009	<0.005	<3.33	<3.33	<3.33	<4	<3.33	<3.33	<3.33	<3.33	<3.33	<0.005	<0.005	<3.33	<3.33	<0.005
A1-17	A1-17	8/31/2009	<0.005	<3.33	<3.33	<3.33	<4	<3.33	<3.33	<3.33	<3.33	<3.33	<0.005	<0.005	<3.33	<3.33	<0.005
A1-19	A1-19	8/31/2009	<0.005	<3.33	<3.33	<3.33	<4	<3.33	<3.33	<3.33	<3.33	<3.33	<0.005	<0.005	<3.33	<3.33	<0.005
A1-20	A1-20	8/31/2009	<0.005	<3.33	<3.33	<3.33	<4	<3.33	<3.33	<3.33	<3.33	<3.33	<0.005	<0.005	<3.33	<3.33	<0.005
1991 Espey, Houston & Associates, Phase 2A Environmental Site Assessment (Preliminary Assessment, Ref. 19)																	
B-1	B-1 11-12'	9/30/1991	<2.18	<2.18	<2.18	<2.18	<2.18	<2.18	<2.18	2.9	<2.18	<2.18	---	<2.18	<2.18	<2.18	<0.005
B-2	B-2 11-11.5'	9/30/1991	<2.18	<2.18	<2.18	<2.18	<2.18	<2.18	<2.18	7.8	<2.18	<2.18	---	<2.18	<2.18	<2.18	<0.005
B-3	B-3 12.5-13'	9/30/1991	<2.18	<2.18	<2.18	<2.18	<2.18	<2.18	<2.18	6.4	<2.18	<2.18	---	<2.18	<2.18	<2.18	0.028

Notes:
1. --- = No value available for that compound for that sample.
2. < = not detected above reporting limit
3. J = estimated concentration.
4. Not all qualifier flags from original data are included in this table.
5. Only compounds detected in at least one soil sample are included in this table.

Table 4 - USOR Area of Investigation 1
Pesticide Concentrations in Soil Samples

Location	Sample ID	Sample Depth (ft below grade)	Aldrin (mg/kg)	alpha-BHC (mg/kg)	beta-BHC (mg/kg)	delta-BHC (mg/kg)	gamma-BHC (mg/kg)	4,4'-DDD (mg/kg)	4.4'-DDE (mg/kg)	4,4'-DDT (mg/kg)	Dieldrin (mg/kg)	Endosulfan Sulfate (mg/kg)	Endrin (mg/kg)	Endrin Aldehyde (mg/kg)	Methoxychlor (mg/kg)
1991 Espey, Houston & Associates, Phase 2A Environmental Site Assessment (Preliminary Assessment, Ref. 19)															
B-1	B-1 11-12'	11/12/13	<0.0027	<0.002	<0.004	<0.006	<0.0027	<0.0074	<0.0024	<0.008	<0.0013	<0.0442	<0.004	<0.0154	<0.118
B-2	B-2 11-11.5'	11-11.5	0.0047	0.024	0.0158	<0.006	<0.0027	0.0094	0.0037	0.0211	<0.0013	<0.0442	<0.004	<0.0154	<0.118
B-3	B-3 12.5-13'	12.5-13	<0.070	<0.05	1.2	0.37	<0.07	3.8	2.6	8.7	1.7	4.6	8.2	4.2	8.4

Notes:
1. --- = No value available for that compound for that sample.
2. < = not detected above reporting limit
3. J = estimated concentration.
4. Not all qualifier flags from original data are included in this table.
5. Only compounds detected in at least one soil sample are included in this table.

Table 5 - USOR Area of Investigation 1
Metals and Pesticides Concentrations in Groundwater Samples

Location	Sample ID	Date Sampled	Arsenic (mg/L)	Copper (mg/L)	alpha-BHC (mg/kg)	beta-BHC (mg/kg)	delta-BHC (mg/kg)	gamma-BHC (mg/kg)
1991, Espey, Houston & Associates (Preliminary Asssessment, Ref. 19)								
B-1	B-1	9/30/1991	5.77	0.17	0.00008	0.00022	<0.006	0.00004

Notes:

1. < = not detected above reporting limit
2. Only compounds detected in at least one sample are included in this table.

Table 6 - USOR Area of Investigation 1
Metals Concentrations in Surface Water Samples
2011 Data

Location	Sample ID	Date Sampled	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Magnesium (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Nickel (mg/L)	Potassium (mg/L)	Selenium (mg/L)	Silver (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
March 2011 EPA START-3 Sampling Event (HRS, p. 14, Reference 44)																						
PPE-01	PPE-01-00-11-20110303	3-Mar-11	0.426 J	<0.002	0.0158 J	0.0704	<0.001	<0.001	0.004 J	<0.001	0.002 J	0.211	0.0018 J	229	0.0336	<0.0002	0.0045	82.3	<0.005	<0.001	0.0009 J	0.0172 J
PPE-02	PPE-02-00-11-20110303	3-Mar-11	0.284 J	<0.002	0.0191 J	0.0655 J	<0.001	<0.001	0.0033 J	<0.001	0.0024 J	<0.2	<0.002	280	0.0338	<0.0002	0.0036 J	97	<0.005	<0.001	<0.005	0.0128 J
PPE-03	PPE-03-00-11-20110302	2-Mar-11	<0.02	<0.002	0.0192 J	0.0789	<0.001	<0.001	0.004 J	<0.001	<0.002	0.202	<0.001	260 J	0.0429	<0.0002	0.0042	90.4 J	<0.005	<0.001	<0.005	0.0131 J
PPE-04	PPE-04-00-11-20110302	2-Mar-11	<0.02	<0.002	0.0188 J	0.0917	<0.001	<0.001	0.0039 J	<0.001	<0.002	0.0977 J	<0.001	285	0.0453	<0.0002	0.0042	95 J	0.0054J	<0.001	0.0012 J	0.0098 J
PPE-05	PPE-05-00-11-20110301	1-Mar-11	<0.02	<0.002	0.0192 J	0.0688	<0.001	<0.001	0.0032 J	<0.001	<0.002	0.141 J	<0.001	258 J	0.0469	<0.0002	0.0039	89 J	0.0105J	<0.001	<0.0024	0.0142 J
PPE-06	PPE-06-00-11-20110301	1-Mar-11	<0.02	<0.002	0.0191 J	0.0695	<0.001	<0.001	<0.002	<0.001	<0.002	0.171 J	<0.001	232	0.0465	<0.0002	0.0041	81	0.0087J	<0.001	0.0015 J	0.0149 J
SED-01	BG-01-00-11-20110303	3-Mar-11	0.069 J	<0.004	0.021 J	0.0582 J	<0.002	<0.001	<0.004	<0.002	<0.004	<0.4	<0.002	240	0.0352	<0.0002	<0.002	85.5	<0.01	<0.001	<0.01	0.0201 J
SED-02	BG-02-00-11-20110301	1-Mar-11	<0.02	<0.002	0.0149 J	0.0728	<0.001	<0.001	<0.002	<0.001	<0.002	0.16 J	0.0016 J	264	0.0426	<0.0002	0.0039	89.8	<0.005	0.0017 J	0.0027 J	0.0141 J
SW-01	SW-01-00-11-20110302	2-Mar-11	<0.02	<0.002	0.02 J	0.0768	<0.001	<0.001	0.0043 J	<0.001	<0.002	0.16 J	<0.001	256	0.0381	<0.0002	0.0041	88.9	<0.005	<0.001	0.002 J	0.0139 J
SW-02	SW-02-00-11-20110302	2-Mar-11	<0.02	<0.002	0.0189 J	0.0738	<0.001	<0.001	0.0042 J	<0.001	<0.002	0.121 J	0.001	267	0.0372	<0.0002	0.0042	92.6	<0.005	<0.001	0.00016 J	0.0125 J
SW-03	SW-03-00-11-20110303	3-Mar-11	1.42	<0.002	0.0169 J	0.083	<0.001	<0.001	0.006 J	0.0018J	0.0058 J	1.24	0.016	245	0.0786	<0.0002	0.0055	86.5	<0.005	<0.001	0.0038 J	0.0347 J
SW-04	SW-04-00-11-20110303	3-Mar-11	0.466	<0.002	0.0148 J	0.0687	<0.001	<0.001	0.0041 J	<0.001	0.002 J	0.247	0.0025	230	0.0344	<0.0002	0.0041	82.5	<0.005	<0.001	0.00021 J	0.0152 J
SW-05	SW-05-00-11-20110303	3-Mar-11	0.118 J	<0.002	0.018 J	0.0612 J	<0.001	<0.001	0.0029 J	<0.001	0.0035 J	<0.2	<0.002	232	0.0314	<0.0002	0.0038 J	82.3	<0.005	<0.001	<0.005	0.015 J
SW-06	SW-06-00-11-20110302	2-Mar-11	0.277	<0.002	0.0143 J	0.0486	<0.001	<0.001	0.0033 J	<0.001	0.0012 J	0.0686 J	<0.001	121	0.0235	<0.0002	0.0035	50.6	<0.005	<0.001	<0.005	0.0185 J
SW-07	SW-07-00-11-20110303	3-Mar-11	0.306	<0.002	0.0132 J	0.0518	<0.001	<0.001	<0.002	<0.001	0.0014 J	0.0986 J	0.001	139	0.0247	<0.0002	0.0038	55.8	<0.005	<0.001	0.00042 J	0.0188 J
SW-08	SW-08-00-11-20110303	3-Mar-11	0.152 J	<0.002	0.0159 J	0.0533 J	<0.001	<0.001	0.0028 J	<0.001	0.0016 J	<0.2	<0.002	169	0.0261	<0.0002	0.0032 J	75.1	<0.005	<0.001	<0.005	0.0131 J
SW-09	SW-09-00-11-20110302	2-Mar-11	<0.02	<0.002	0.0189 J	0.092	<0.001	<0.001	0.0037 J	<0.001	<0.002	0.0942 J	<0.001	288 J	0.0445	<0.0002	0.0042	94.7 J	0.0057J	<0.001	0.00065 J	0.0091 J
SW-10	SW-10-00-11-20110302	2-Mar-11	<0.02	<0.002	0.0185 J	0.0617	<0.001	<0.001	0.0032 J	<0.001	<0.002	0.0932 J	<0.001	229 J	0.0334	<0.0002	0.0037	80.8 J	0.0064J	<0.001	0.0016 J	0.0147 J
SW-11	SW-11-00-11-20110301	1-Mar-11	<0.02	<0.002	0.0168 J	0.0662	<0.001	<0.001	<0.002	<0.001	<0.002	0.101 J	<0.001	217	0.0427	<0.0002	0.0039	78.3	0.0067	<0.001	0.0021 J	0.014 J

Notes:
1. All surface water samples from Vince Bayou are included on this table, regardless of their location relative to Operable Unit 1 or Operable Unit 2.
2. Samples SED-01 and SED-02 were collected at background locations
3. J = estimated concentration.
4. < = not detected above reporting limit.
5. Not all qualifier flags from original data are included in this table.
6. Only compounds detected in at least one sample are included in this table.

Table 7 - USOR Area of Investigation 1
Metals Concentrations in Sediment Samples
2011 Data

Location	Sample ID	Sample Date	Aluminum (mg/kg)	Arsenic (mg/kg)	Barium (mg/kg)	Beryllium (mg/kg)	Cadmium (mg/kg)	Calcium (mg/kg)	Chromium (mg/kg)	Cobalt (mg/kg)	Copper (mg/kg)	Iron (mg/kg)	Lead (mg/kg)	Magnesium (mg/kg)	Manganese (mg/kg)	Mercury (mg/kg)	Nickel (mg/kg)	Potassium (mg/kg)	Selenium (mg/kg)	Silver (mg/kg)	Sodium (mg/kg)	Vanadium (mg/kg)	Zinc (mg/kg)
March 2011 EPA START-3 Sampling Event (HRS, p.14, Reference 44)																							
PPE-01	PPE-01-03-51	3/3/2011	9620	10.3J	103	0.67U	0.67U	20000	20.4J	4J	13.6J	11300J	76.3	3080	164J	0.35	7.2J	1530	3.4 UJ	1	1870	17.1J	71J
PPE-02	PPE-02-03-51	3/3/2011	12800	4.7J	115	0.79U	0.79U	8820	24.9J	5.6J	22.7J	13200J	120	3930	155J	0.32	13J	2040	7.9 UJ	2.3	2180	18.5J	118J
PPE-03	PPE-03-03-51	3/2/2011	8550	2.2J	78.6	0.85UJ	1.1J	17200	14.4J	3.4J	15.5J	10000	57.3J	3140	74.3J	0.11J	7.3J	1620	---	1.1	2490J	13.7J	112J
PPE-04	PPE-04-03-51	3/2/2011	7480	2J	85.2	0.72UJ	0.72UJ	18000	14J	4.6J	13.9J	9740	32J	2790	94.1J	0.064J	7.8J	1420	---	0.72U	2070J	16J	76.3J
PPE-05	PPE-05-03-51	3/2/2011	13300	2.4J	96.4	0.95UJ	0.95UJ	28900	17.2J	4.8J	18.7J	13600	41.2J	4390	123J	0.13J	10.3J	2430	---	0.95U	3080J	18.7J	116J
PPE-06	PPE-06-03-51	3/2/2011	10500	2.6J	102	0.88UJ	0.88UJ	32700	16.4J	4.5J	17.7J	12000	34.8J	3830	118J	0.051J	8.6J	1920	---	0.88U	2080J	17.7J	101J
SED-01	BG-01-03-51	3/3/2011	16900	2.3J	196	0.81J	0.65U	133000	12.4J	4.3J	5.9J	15200J	10.3	6330	148J	0.0083J	9.5J	2970	3.3 UJ	0.65U	1440	20.1J	16.9J
SED-02	BG-02-03-51	3/2/2011	10100	2.3J	81	0.7UJ	0.7UJ	25200	16.2J	4.3J	16.7J	12600	50.5J	3630	158J	0.076J	7.8J	1880	---	0.7U	2120J	16.1J	74J
SW-01	SED-01-03-51	3/2/2011	9760	13.1J	117	0.82UJ	0.82UJ	34100	18.9J	5.7J	15.7J	13700	106J	3420	215J	0.15J	8.9J	1710	---	0.82U	2600J	20J	103J
SW-02	SED-02-03-51	3/2/2011	18900	11.8J	150	0.93J	0.68UJ	29200	13.1J	4.9J	5.2J	16400	15.6J	4140	113J	0.92	7.6J	2230	---	0.68U	2020J	21.2J	16.6J
SW-03	SED-03-03-51	3/2/2011	14400	5.9J	114	0.87U	0.87U	18200	19.9J	4.7J	21.7J	14000J	64.4	4550	91.8J	0.32	10.8J	2360	4.4 UJ	1.7	2460	19.9J	118J
SW-04	SED-04-03-51	3/3/2011	6310	19.3J	109	0.67U	0.67U	9000	15.8J	3.4J	10.4J	6030J	57.5	1770	83.8J	1.8	6.5J	997	3.4 UJ	0.7	982	17.4J	30.6J
SW-05	SED-05-03-51	3/3/2011	8000	1.3J	62	0.74U	0.74U	6880	11.4J	2J	9.7J	8650J	38.4	2280	71J	0.13J	5.5J	1260	3.7 UJ	0.74U	1790	9.8J	65.9J
SW-06	SED-06-03-51	3/3/2011	7700	4J	86.7	0.6U	0.6U	137000	15.9J	3.8J	12.2J	11600J	57.1	4620	305J	0.075J	9J	1080	6 UJ	0.6U	1470	13.9J	132J
SW-07	SED-07-03-51	3/3/2011	10800	2.4J	89	0.69U	0.69U	16000	17J	5J	11.8J	12800J	55	4070	203J	0.14	9.4J	1760	3.5 UJ	0.92	1270	17.7J	87.4J
SW-08	SED-08-03-51	3/3/2011	17100	2.9J	291	1.1J	0.9	8890	40.6J	5.8J	45.3J	16200J	196	5640	116J	0.81	17J	2630	8.2 UJ	7.9	2220	23.9J	160J
SW-09	SED-09-03-51	3/2/2011	12800	2.2J	110	0.74J	0.69UJ	19900	21.1J	4.4J	14.8J	14600	122J	4330	106J	0.33	10.1J	2190	---	1.8	2220J	18.8J	114J
SW-10	SED-10-03-51	3/2/2011	15400	5.9J	178	3.4UJ	0.68UJ	3740	19.6J	26.7J	9.5J	17400	30.1J	2450	1030J	0.013J	14.1J	1740	---	0.68U	1770J	48.7J	13.5J
SW-11, PPE-06A	SED-11-03-51	3/2/2011	2630	2.3J	41.7	0.64UJ	0.64UJ	137000	23.4J	1.6J	8.1J	5640	9.8J	9770	310J	0.027J	4.5J	639U	---	0.64U	1160J	15J	40.1J

Notes:
1. All sediment samples from Vince Bayou are included on this table, regardless of their location relative to Operable Unit 1 or Operable Unit 2.
2. Samples SED-01 and SED-02 were collected at background locations
3. J = estimated concentration.
4. < or U = not detected above reporting limit.
5. Not all qualifier flags from original data are included in this table.
6. Only compounds detected in at least one sample are included in this table.

Table 8 - USOR Area of Investigation 1
Volatile and Semi-Volatile Organic Compound Concentrations in Sediment Samples

Location	Sample ID	Sample Date	Anthracene (mg/kg)	Benzo (a) anthracene (mg/kg)	Benzo (a) pyrene (mg/kg)	Benzo (b) fluoranthene (mg/kg)	Benzo (g,h,i) perylene (mg/kg)	Benzo (k) fluoranthene (mg/kg)	Bis (2-ethylhexyl) phthalate (mg/kg)	Carbon disulfide (mg/kg)	Chlorobenzene (mg/kg)	Chrysene (mg/kg)	Dibenz (a,h) anthracene (mg/kg)	Di-n-octyl phthalate (mg/kg)	Fluoranthene (mg/kg)	Fluorene (mg/kg)	Indeno (1,2,3-cd) pyrene (mg/kg)	Methyl acetate (mg/kg)	2-Methylnaphthalene (mg/kg)	Naphthalene (mg/kg)	Phenanthrene (mg/kg)	Pyrene (mg/kg)	Toluene (mg/kg)	Xylenes (mg/kg)
EPA Emergency Response 2011																								
PPE-01	PPE-01-03-51	3/3/2011	<0.289	<0.723	<0.723	<0.723	<0.723	<0.723	<0.723	<0.0982	<0.0982	<0.723	<0.723	<0.723	<0.289	<0.289	<0.723	<0.245	<0.289	<0.289	<0.289	<0.289	<0.0982	<0.196
PPE-02	PPE-02-03-51	3/3/2011	<0.294	0.778	1.26	1.56	1.45J	1.01	<0.735	<0.0999	<0.0999	1.17	<0.735	<0.735	1.58	<0.294	1.1	<0.25	<0.294	<0.294	0.428	1.54	<0.0999	<0.2
PPE-03	PPE-03-03-51	3/2/2011	<0.309	0.934	1.24	1.49	0.892	0.982	7.45	0.146B	<0.1	1.27	<0.772	<0.772	2.28	<0.309	<0.772	<0.25	<0.309	<0.309	0.318	2.43	<0.1	<0.2
PPE-04	PPE-04-03-51	3/2/2011	<0.289	0.873	1.4	1.81	0.805	1.13	1.21	<0.0991	<0.0991	1.54	<0.721	<0.721	2.02	<0.289	0.794	<0.248	<0.289	<0.289	0.56	2.22	<0.0991	<0.198
PPE-05	PPE-05-03-51	3/2/2011	<0.406	1.4	2.16	2.55	1.79	1.65	1.88	<0.0992	<0.0992	2.43	<1.01	<1.01	3.15	<0.406	1.59	<0.248	0.544	0.416	1.25	3.71	<0.0992	<0.198
PPE-06	PPE-06-03-51	3/2/2011	<0.332	1.29	2.01	2.41	1.57	1.62	1.95	<0.0999	<0.0999	2.25	<0.831	<0.831	2.81	<0.332	1.42	<0.25	<0.332	<0.332	0.834	3.37	<0.0999	<0.2
SED-01	BG-01-03-51	3/3/2011	<0.252	<0.629	<0.629	<0.629	<0.629	<0.629	<0.629	<0.099	<0.099	<0.629	<0.629	<0.629	<0.252	<0.252	<0.629	<0.248	<0.252	<0.252	<0.252	<0.252	<0.099	<0.198
SED-02	BG-02-03-51	3/2/2011	<0.278	1.16	1.74	1.9	1.37	1.39	<0.694	<0.0998	<0.0998	1.75	<0.694	<0.694	2.53	<0.278	1.16	<0.249	<0.278	<0.278	0.75	2.74	<0.0998	<0.2
SW-01	SED-01-03-51	3/2/2011	<0.278	2.05	2.82	3.04	2.27	1.99	0.904B	<0.0836	<0.0836	3.02	<0.695	<0.695	4.72	<0.278	2.08	0.485	<0.278	<0.278	1.79	4.73	<0.0836	<0.167
SW-02	SED-02-03-51	3/2/2011	<0.267	<0.668	<0.668	<0.668	<0.668	<0.668	<0.668	<0.0998	<0.0998	<0.668	<0.668	<0.668	0.491	<0.267	<0.668	<0.25	<0.267	<0.267	<0.267	0.513	<0.0998	<0.2
SW-03	SED-03-03-51	3/2/2011	<0.279	1.2	1.69	1.94	1.36J	1.62	<0.699	<0.1	<0.1	1.65	<0.699	<0.699	2.67	<0.279	1.27	<0.25	<0.279	<0.279	0.741	2.19	<0.1	0.2
SW-04	SED-04-03-51	3/3/2011	<0.268	<0.669	<0.669	<0.669	<0.669	<0.669	<0.669	<0.0999	<0.0999	<0.669	<0.669	<0.669	<0.268	<0.268	<0.669	<0.25	<0.268	<0.268	<0.268	<0.268	<0.0999	<0.2
SW-05	SED-05-03-51	3/3/2011	<0.263	1.62	2.5	2.93	2.1J	1.86	<0.657	<0.0999	<0.0999	2.22	0.725	<0.657	3.08	<0.263	1.95	<0.25	<0.263	<0.263	0.711	3.2	<0.0999	<0.2
SW-06	SED-06-03-51	3/3/2011	<0.241	<0.603	1	1.06	0.824J	0.701	<0.603	<0.1	<0.1	0.737	<0.603	<0.603	0.887	<0.241	0.656	<0.25	<0.241	<0.241	0.363	0.968	<0.1	<0.2
SW-07	SED-07-03-51	3/3/2011	<0.27	0.889	1.5	1.87	1.63J	1.33	<0.675	<0.0998	<0.0998	1.44	<0.675	<0.675	2.01	<0.27	1.41	<0.25	<0.27	<0.27	0.579	2.19	<0.0998	<0.2
SW-08	SED-08-03-51	3/3/2011	<0.303	<0.757	0.998	1.21	0.92	<0.757	<0.757	<0.1	<0.1	0.872	<0.757	<0.757	1.07	<0.303	0.774	<0.25	<0.303	<0.303	<0.303	1.14	<0.1	<0.2
SW-09	SED-09-03-51	3/2/2011	<0.279	0.82	1.28	1.29	1.19	1.09	<0.698	<0.0999	<0.0999	1.22	<0.698	<0.698	1.63	<0.279	1.09	<0.25	<0.279	<0.279	0.424	1.53	<0.0999	<0.2
SW-10	SED-10-03-51	3/2/2011	<0.252	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.0997	<0.0997	<0.63	<0.63	<0.63	<0.252	<0.252	<0.63	<0.249	<0.252	<0.252	<0.252	<0.252	<0.0997	<0.199
SW-11, PPE-06A	SED-11-03-51	3/2/2011	<0.22	<0.55	<0.55	<0.55	<0.55	<0.55	0.563B	<0.0998	<0.0998	<0.55	<0.55	<0.55	<0.22	<0.22	<0.55	<0.25	<0.22	<0.22	<0.22	<0.22	<0.0998	<0.2

Notes:
1. All sediment samples from Vince Bayou are included on this table, regardless of their location relative to Operable Unit 1 or Operable Unit 2.
2. Samples SED-01 and SED-02 were collected at background locations
3. J = estimated concentration.
4. < or U = not detected above reporting limit.
5. Not all qualifier flags from original data are included in this table.
6. Only compounds detected in at least one sample are included in this table.

TABLE 9 – DATA QUALITY OBJECTIVES FOR AOI-1

DQO STEP:	Preliminary Conceptual Site Model Exposure Media
1. State the Problem	*Historical information suggests that contamination exists in on-property soil in areas of former operations, and that contaminants may have migrated off-property during unauthorized releases, spills and overland runoff following storm events.*
2. Identify the Goal of the Study	*Conduct an investigation and assess the potential risks posed by releases of chemicals associated with the USOR Property, assess potential human health and ecological risks associated with past USOR property activities, and develop remedial alternatives to address any unacceptable risks.*
AOI-1 ON-PROPERTY GROUNDWATER	
2a. Identify the Principal Study Questions	1. Do COPCs in groundwater exceed applicable state and federal groundwater quality standards or AOI-1-specific risk-based criteria established for human receptors? 2. Do non-aqueous phase liquids (NAPLs) or the potential for NAPL based on COPC concentrations exist in groundwater?
2b. Define Alternative Actions	*The alternative actions that could result from the resolution of the principal study questions are to recommend that portions of the USOR Property i) require no further evaluation or selection of a remedy; or ii) warrant additional assessment or selection of a remedy.*
3. Identify Information Inputs	• Evaluate AOI-1 hydrogeology. • Evaluate concentrations of COPCs in uppermost groundwater-bearing unit. • Perform water well and water use survey of area. • Perform a water well records search within ½-mile of AOI-1. Confirm that nearby properties are provided potable water from the local municipality. • Perform subsurface utility survey to identify obstructions for drilling program and preferential pathways for migration of COPCs. • Identify ongoing and/or historic spills/releases that have or have the potential to impact groundwater. • Evaluate potential for discharge of groundwater to surface water. • Evaluate groundwater data to assess possibility of vapor intrusion (model).
4. Identify the Boundaries of the Study	• The spatial boundaries of the project are the groundwater contained within the USOR Property and any down-gradient groundwater that may have been impacted by on-property groundwater. • The PCSMs show the receptors of potential concern for this pathway. • The sampling unit for groundwater is the entire upper-most groundwater bearing unit when evaluating the potential for vapor intrusion, or point of exposure wells if impacted groundwater discharges to surface water, or lower groundwater units if shown to be impacted.

TABLE 9 – DATA QUALITY OBJECTIVES FOR AOI-1

DQO STEP:	**Preliminary Conceptual Site Model Exposure Media**
AOI-1 ON-PROPERTY SOIL	
2a. Identify the Principal Study Questions	1. Do COPCs in on-property soil pose an unacceptable risk to human health or ecological receptors? 2. Do COPCs in on-property subsurface soil pose an unacceptable risk to human health receptors? 3. What are the general soil characteristics to evaluate impact or COPC mobilization or sequestration in soil? 4. What is surface runoff drainage patterns at AOI-1?
2b. Define Alternative Actions	*The alternative actions that could result from the resolution of the principal study questions are to recommend that portions of the USOR Property i) require no further evaluation or selection of a remedy; or ii) warrant additional assessment or selection of a remedy.*
3. Identify Information Inputs	• Evaluate lateral and vertical extent of COPCs in samples of AOI-1 surface soil (0 to 0.5 ft bgs), shallow soils (0.5 to 5 ft bgs) and subsurface soil (greater than 5 ft bgs). • Collect general soil chemistry data (pH, TOC, grain size, etc.). • Evaluate topography and preferential surface water drainage pathways. • Identify ongoing and/or historic spills releases that have or have the potential to impact on-property soil.
4. Identify the Boundaries of the Study	• The spatial boundaries of the project are the soil contained within the USOR Property and any topographically lower areas that may have been impacted by surface runoff or direct releases. • The PCSMs show the receptors of potential concern for this pathway. • The sampling unit for soil is 0 to 0.5 feet below ground surface (bgs), 0.5 to 5 ft. bgs, and 5 ft. bgs to the top of the saturated zone.

TABLE 9 – DATA QUALITY OBJECTIVES FOR AOI-1

AOI-1 ON-PROPERTY SEDIMENT ***(SOUTHWEST AREAS OF AOI-1 WHERE SURFACE WATER IS PRESENT FOR THE MAJORITY OF THE YEAR)***	
2a. Identify the Principal Study Questions	1. Do COPCs in on-property sediment pose an unacceptable risk to human health or ecological receptors? 2. What is the nature of habitat in areas where sediment is present?
2b. Define Alternative Actions	*The alternative actions that could result from the resolution of the principal study questions are to recommend that portions of the USOR Property i) require no further evaluation or selection of a remedy; or ii) warrant additional assessment or selection of a remedy.*
3. Identify Information Inputs	• Identify ongoing and/or historic spills/releases that have or have the potential to impact on-property sediment. • Collect sediment samples from areas of standing water on-property.
4. Identify the Boundaries of the Study	• The spatial boundaries of the project are the sediments contained within the low-lying areas in the southwest portion of the USOR property. • The PCSMs show the receptors of potential concern for this pathway. • The sampling unit for these sediments is the biologically active zone for the areas with water standing for the majority of the year.
AOI-1 ON-PROPERTY SURFACE WATER ***(SOUTHWEST AREAS OF AOI-1 WHERE SURFACE WATER IS PRESENT FOR THE MAJORITY OF THE YEAR)***	
2a. Identify the Principal Study Questions	1. Do COPCs in on-property surface water in the southwest portion of the USOR Property pose an unacceptable risk to human health or ecological receptors? 2. What is the general chemistry of on-property surface water? 3. What is the nature of the habitat in areas where on-property surface water is present?
2b. Define Alternative Actions	*The alternative actions that could result from the resolution of the principal study questions are to recommend that portions of the USOR Property i) require no further evaluation or selection of a remedy; or ii) warrant additional assessment or selection of a remedy.*
3. Identify Information Inputs	• Identify ongoing and/or historic spills/releases that have or have the potential to impact on-property surface water. • Collect data necessary to characterize origin of standing water. • Collect surface water samples in standing water for analysis of COPCs.

TABLE 9 – DATA QUALITY OBJECTIVES FOR AOI-1

4. Identify the Boundaries of the Study	• The spatial boundaries of the project are the low-lying area at the southwest portion of the USOR Property with standing water. • The PCSMs show the receptors of potential concern for this pathway. • The sampling unit for surface water is a depth approximately halfway between the surface and the bottom of the standing water.
ON-PROPERTY AND OFF-PROPERTY AIR	
2a. Identify the Principal Study Questions	1. Do COPCs in on-property and off-property soil or groundwater pose an unacceptable risk to human health via inhalation? 2. How do characteristics such as the presence and quality of vegetative cover, soil type and local meteorological data effect on- and off-property air concentrations (outdoor ambient air as well as indoor air)?
2b. Define Alternative Actions	*The alternative actions that could result from the resolution of the principal study questions are to recommend that portions of the USOR Property i) require no further evaluation or selection of a remedy; or ii) warrant additional assessment or selection of a remedy.*
3. Identify Information Inputs	1. Use on-property soil and groundwater COPC concentration data and AOI-1-specific information to estimate or model potential emissions of volatile organic compounds and fugitive dust in on-property and off-property air.
4. Identify the Boundaries of the Study	• The spatial boundaries of the project are affected area of soil and groundwater. • The PCSMs show the receptors of potential concern for this pathway. • The sampling unit for this pathway will be surface soil for fugitive dust generation, subsurface for VOC emissions and impacted subsurface soil and groundwater for indoor VOC intrusion.

TABLE 9 – DATA QUALITY OBJECTIVES FOR AOI-1

OFF-PROPERTY SURFACE SOIL	
2a. Identify the Principal Study Questions	1. Do COPCs in off-property soil pose an unacceptable risk to human health or ecological receptors? 2. Do COPCs in on-property and off-property soil or groundwater pose an unacceptable risk to human health via inhalation? 3. What are the general soil characteristics to evaluate impact or COPC mobilization or sequestration in soil? 4. What are surface runoff drainage patterns in the off-property area?
2b. Define Alternative Actions	*The alternative actions that could result from the resolution of the principal study questions are to recommend that portions of the USOR Property i) require no further evaluation or selection of a remedy; or ii) warrant additional assessment or selection of a remedy.*
3. Identify Information Inputs	1. Evaluate lateral and vertical extent of COPCs in samples of off-property surface soil (0 to 0.5 ft bgs), shallow soils (0.5 to 5 ft bgs) and subsurface soil (greater than 5 ft bgs), depending on the nature of the soil area being investigated.. 2. Collect general soil chemistry data (pH, TOC, grain size, etc.). 3. Evaluate topography and preferential surface water drainage pathways. 4. Identify ongoing and/or historic spills releases that have or have the potential to impact off-property soil.
4. Identify the Boundaries of the Study	• The spatial boundaries of the project are the off-property soil outside of the USOR property extending to Vince Bayou. • The PCSMs show the receptors of potential concern for this pathway. The sampling unit for soil is 0 to 0.5 feet below ground surface (bgs), 0.5 to 5 ft. bgs, and 5 ft. bgs to the top of the saturated zone, depending on the nature of the soil area being investigated.
OFF-PROPERTY SURFACE WATER	
2a. Identify the Principal Study Questions	1. Do COPCs in surface water in Vince Bayou and Little Vince Bayou pose an unacceptable risk to human health or ecological receptors? 2. Do COPCs in surface water in background areas pose an unacceptable risk to human health or ecological receptors? 3. What is the general chemistry of surface water (near AOI-1 and in background areas)? 4. What is the watershed sub-basin and what are the associated uses of the off-property surface water? 5. What is the nature of the habitat in areas where off-property surface water is present? 6. What are the surface water flow characteristics in Vince Bayou and Little Vince Bayou?
2b. Define Alternative Actions	*The alternative actions that could result from the resolution of the principal study questions are to recommend that portions of AOI-1 i) require no further evaluation or selection of a remedy; or ii) warrant additional assessment or selection of a remedy.*

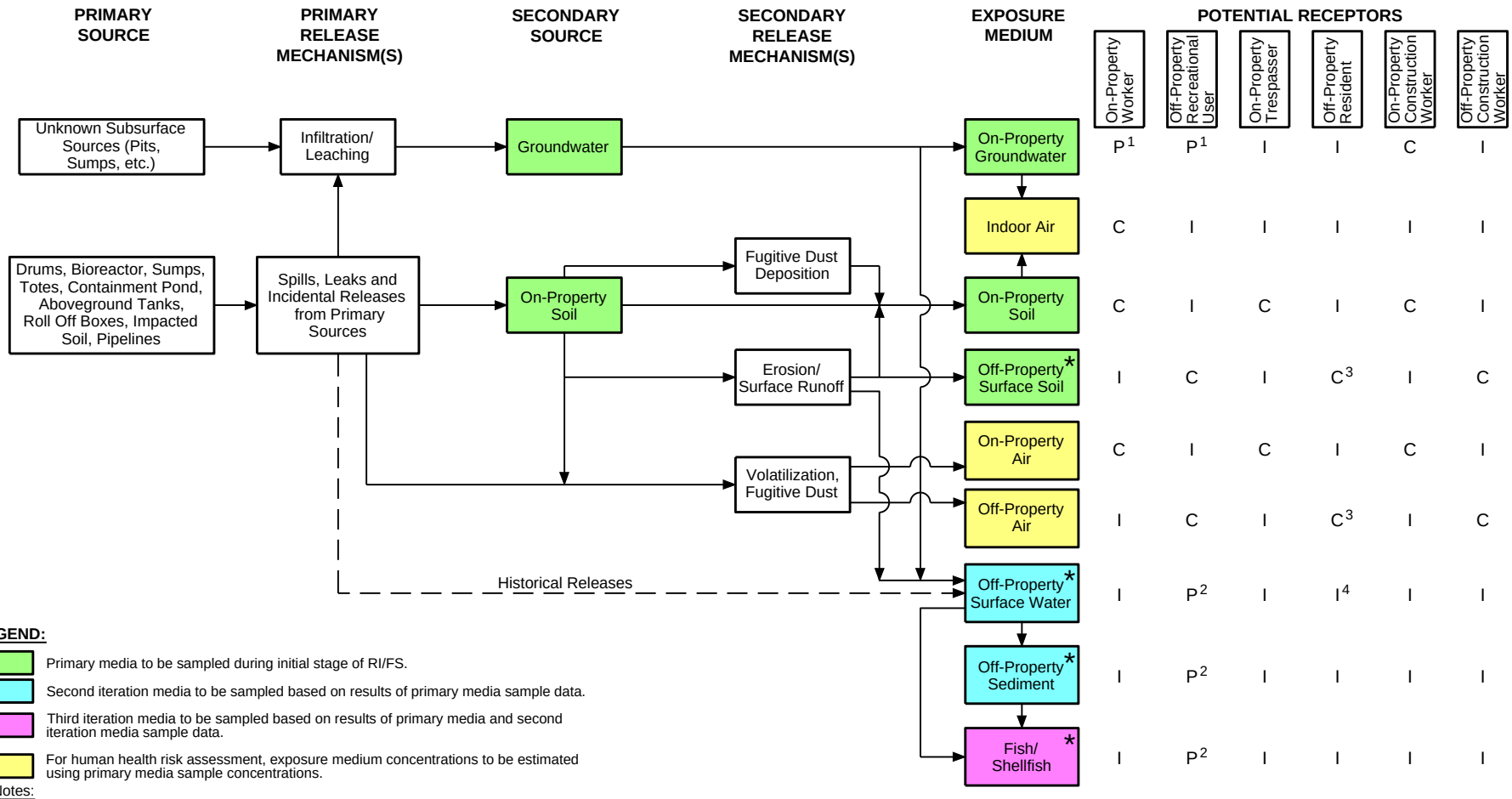
TABLE 9 – DATA QUALITY OBJECTIVES FOR AOI-1

3. Identify Information Inputs	1. Delineate the boundary and drainage within the watershed sub-basin. 2. Identify potential land use practices that might have impacted surface water adjacent to AOI-1. 3. Identify on-going and/or historic spills/releases that have or have the potential to impact surface water. 4. Collect data to characterize surface water flow regime (e.g., flow velocity, groundwater to surface water interactions, etc.). 5. Evaluate the surface water quality and the potential presence of COPCs in surface water.
4. Identify the Boundaries of the Study	• The spatial boundaries of the project are the surface water in Vince Bayou and Little Vince Bayou near the USOR Property. • The PCSMs show the receptors of potential concern for this pathway. • The sampling unit for surface water is a depth approximately halfway between the surface and the bottom of the water body in Vince Bayou and Little Vince Bayou and background areas.
OFF-PROPERTY SEDIMENT	
2a. Identify the Principal Study Questions	1. Do COPCs in off-property sediment pose an unacceptable risk to human health or ecological receptors? 2. Do COPCs in off-property sediment in background areas pose an unacceptable risk to human health or ecological receptors? 3. What is the nature of habitat in areas where sediment is present? 4. What is the general chemistry and physical characteristics of off-property sediment (near the USOR Property and in background areas)?
2b. Define Alternative Actions	*The alternative actions that could result from the resolution of the principal study questions are to recommend that portions of AOI-1 i) require no further evaluation or selection of a remedy; or ii) warrant additional assessment or selection of a remedy.*
3. Identify Information Inputs	1. Identify ongoing and/or historic spills/releases that have or have the potential to impact sediment in Vince Bayou or Little Vince Bayou. 2. Collect sediment samples from Vince Bayou and background areas upstream in Vince Bayou and Little Vince Bayou.
4. Identify the Boundaries of the Study	• The spatial boundaries of the project are the sediments in Vince Bayou and Little Vince Bayou near the USOR Property. • The PCSMs show the receptors of potential concern for this pathway. • The sampling unit for these sediments is the biologically active zone in Vince Bayou and Little Vince Bayou and background sediment.

TABLE 9 – DATA QUALITY OBJECTIVES FOR AOI-1

FISH AND SHELLFISH	
2a. Identify the Principal Study Questions	1. Do COPCs in Vince Bayou and Little Vince Bayou fish tissue pose an unacceptable risk to human health or ecological receptors?
2b. Define Alternative Actions	*The alternative actions that could result from the resolution of the principal study questions are to recommend that portions of AOI-1 i) require no further evaluation or selection of a remedy; or ii) warrant additional assessment or selection of a remedy.*
3. Identify Information Inputs	• Collect samples from finfish species (legal size limit) commonly caught in the area and consumed; and samples from shellfish caught in the vicinity of AOI-1. • Measure USOR-Property-related COPCs in fish tissue samples collected (COPCs, excluding essential nutrients, detected above sample quantitation limits (SQLs) and background in the sediment samples will determine the list of COPCs to be analyzed in fish tissue samples). • Validate the analytical data. • If warranted, analyze background fish tissue samples for selected COPCs reported in fish tissue samples. • QA/QC samples: Collect 1 field duplicate and 1 MS/MSD sample per species for COPC analyses. • Analytical method detection limit targets will be identified following sediment sampling.
4. Define Boundaries of the Study	• The boundaries are the approximate USOR Property boundaries as extended to the adjacent Vince Bayou. Background samples will be collected from a designated area upstream of this area as well as in Little Vince Bayou. • No vertical boundaries – fish may be sampled from any depth. • The PCSMs show the receptors of potential concern for this pathway. • The sampling unit for fish and shellfish are individual fillet samples although composite shellfish samples may be necessary to provide adequate sample volume.

FIGURES



LEGEND:

- Primary media to be sampled during initial stage of RI/FS.
- Second iteration media to be sampled based on results of primary media sample data.
- Third iteration media to be sampled based on results of primary media and second iteration media sample data.
- For human health risk assessment, exposure medium concentrations to be estimated using primary media sample concentrations.

Notes:

C Pathway is potentially complete.

P Pathway is possibly complete.

I Pathway is incomplete.

1 It is unlikely that shallow groundwater in this area is useable given the salinity. However, data will be collected to characterize the salinity of all relevant groundwater bearing units. A survey of the on- and off-property area for the presence of water wells will also be performed as part of the groundwater investigation. Potential impacts will be investigated to ensure that these pathways are incomplete for off-property groundwater and/or deeper groundwater units, if appropriate.

2 Potential exposures and associated chemicals of concern for these receptors will be evaluated through an iterative process in consideration of primary source data and data for transport media collected during the RI/FS.

3 Potential impacts from soil VOC and particulate dust emissions potentially impacting nearby residents will be evaluated based on the primary media data to evaluate the completeness of migration pathways to off-property air, fruit trees, above-ground and below-ground produce, and domestic livestock.

4 Surface water is not a potable or agricultural resource due to high natural salinity and bacterial levels in the area.

* Sampling of these media to be performed in conjunction with appropriate background sampling.

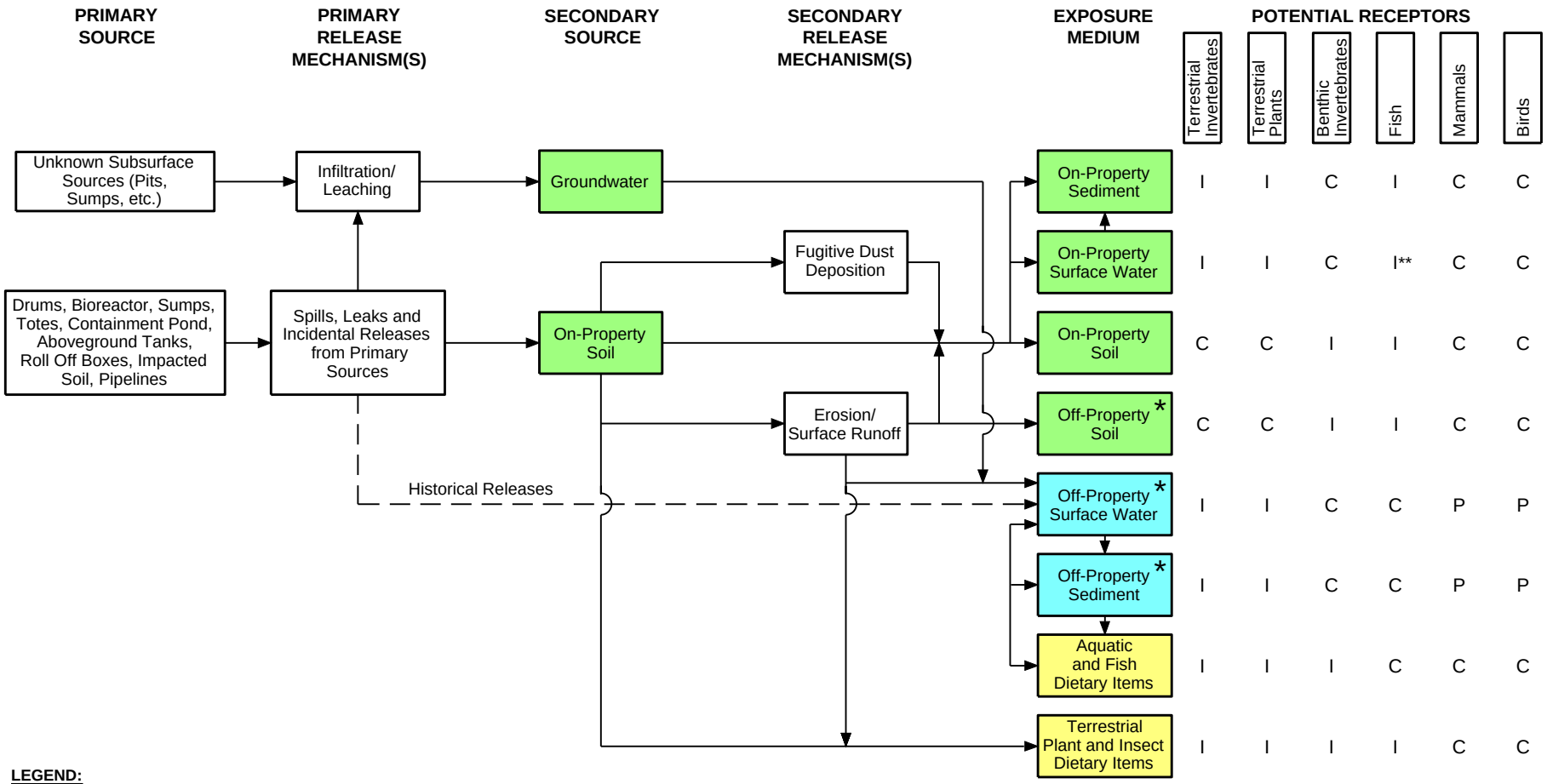
US OIL RECOVERY SITE
PASADENA, TEXAS

Figure 1

PRELIMINARY HUMAN HEALTH CONCEPTUAL SITE MODEL USOR PROPERTY

PROJECT: 1863	BY: ZGK	REVISIONS
DATE: APRIL., 2014	CHECKED: KHT	

PASTOR, BEHLING & WHEELER, LLC
CONSULTING ENGINEERS AND SCIENTISTS



LEGEND:

Primary media to be sampled during initial stage of RI/FS.

Second iteration media to be sampled based on results of primary media sample data.

For screening level ecological risk assessment, exposure medium concentrations to be estimated using primary media sample concentrations.

Notes:

C Pathway is potentially complete.

I Pathway is incomplete.

P Potential exposures for COPCs will be evaluated in an iterative manner based on sample results from primary media.

* Sampling of these media to be performed in conjunction with appropriate background sampling.

** Fish were not observed. If fish are observed during investigation activities, this pathway will be evaluated.

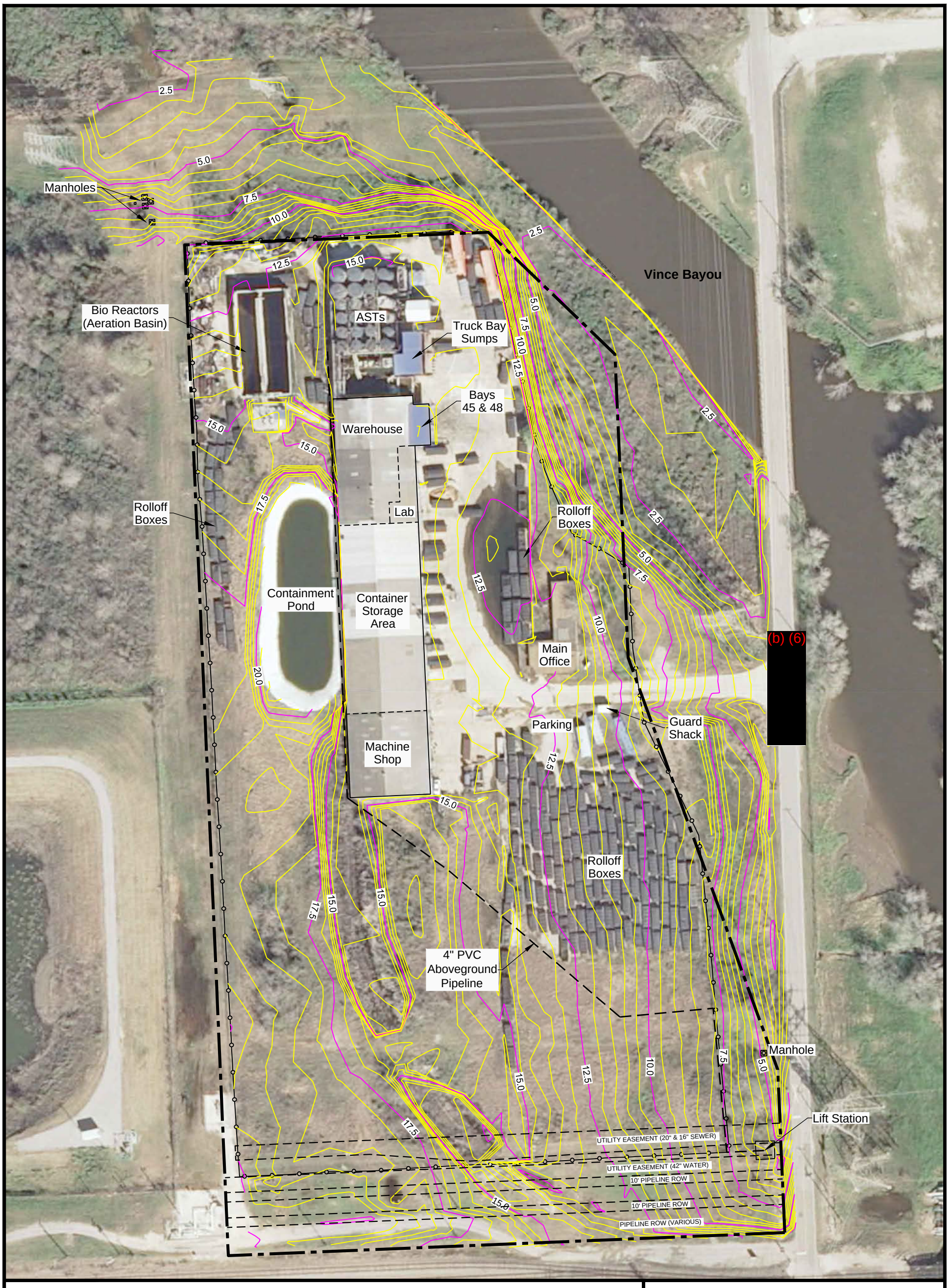
US OIL RECOVERY SITE
PASADENA, TEXAS

Figure 2

PRELIMINARY ECOLOGICAL CONCEPTUAL SITE MODEL USOR PROPERTY

PROJECT: 1863	BY: ZGK	REVISIONS
DATE: APRIL., 2014	CHECKED: KHT	

PASTOR, BEHLING & WHEELER, LLC
CONSULTING ENGINEERS AND SCIENTISTS



EXPLANATION

- Approx. Property Boundary
- Approx. Security Fence

N

Approx. Scale in Feet

0 50 100

Source:
Houston-Galveston Area Council, April 2012 Image, 2012 Aerial Imagery Data is the sole property of Houston-Galveston Area Council, which reserves all rights thereto. Use or reproduction of this data is strictly prohibited absent written consent from the Houston-Galveston Area Council.

US OIL RECOVERY
PASADENA, TEXAS

Figure 3

USOR PROPERTY AREA OF INVESTIGATION 1 SITE LAYOUT

PROJECT: 1863	BY: AJD	REVISIONS
DATE: APRIL, 2014	CHECKED: MKW	

PASTOR, BEHLING & WHEELER, LLC
CONSULTING ENGINEERS AND SCIENTISTS

EXPLANATION

- Approx. Property Boundary
- Approx. Security Fence
- Approx. Soil Sample Location
- Approx. Surface Water Sample Location
- Approx. Background Surface Water and Sediment Sample Location

Source:
Houston-Galveston Area Council, April 2012 Image, 2012 Aerial Imagery Data is the sole property of Houston-Galveston Area Council, which reserves all rights thereto. Use or reproduction of this data is strictly prohibited absent written consent from the Houston-Galveston Area Council.

Notes:

1. See tables 2-8 for sample data.

N

Approx. Scale in Feet

0 75 150

US OIL RECOVERY
PASADENA, TEXAS

Figure 4

AREA OF INVESTIGATION 1 HISTORICAL SAMPLE LOCATION MAP

PROJECT: 1863	BY: AJD	REVISIONS
DATE: APRIL, 2014	CHECKED: MKW	

PASTOR, BEHLING & WHEELER, LLC
CONSULTING ENGINEERS AND SCIENTISTS

EXPLANATION

- Approx. Property Boundary
- Approx. Security Fence
- Approx. Surface Water and/or Sediment Sample Location (EPA, 2011)
- Approx. Background Surface Water and Sediment Sample Location

N

Approx. Scale in Feet

0 125 250

Source:
Houston-Galveston Area Council, April 2012 Image, 2012 Aerial Imagery Data is the sole property of Houston-Galveston Area Council, which reserves all rights thereto. Use or reproduction of this data is strictly prohibited absent written consent from the Houston-Galveston Area Council.

US OIL RECOVERY
PASADENA, TEXAS

Figure 5

HISTORICAL SURFACE WATER AND SEDIMENT SAMPLING LOCATIONS

PROJECT: 1863	BY: AJD	REVISIONS
DATE: APRIL, 2014	CHECKED: MKW	

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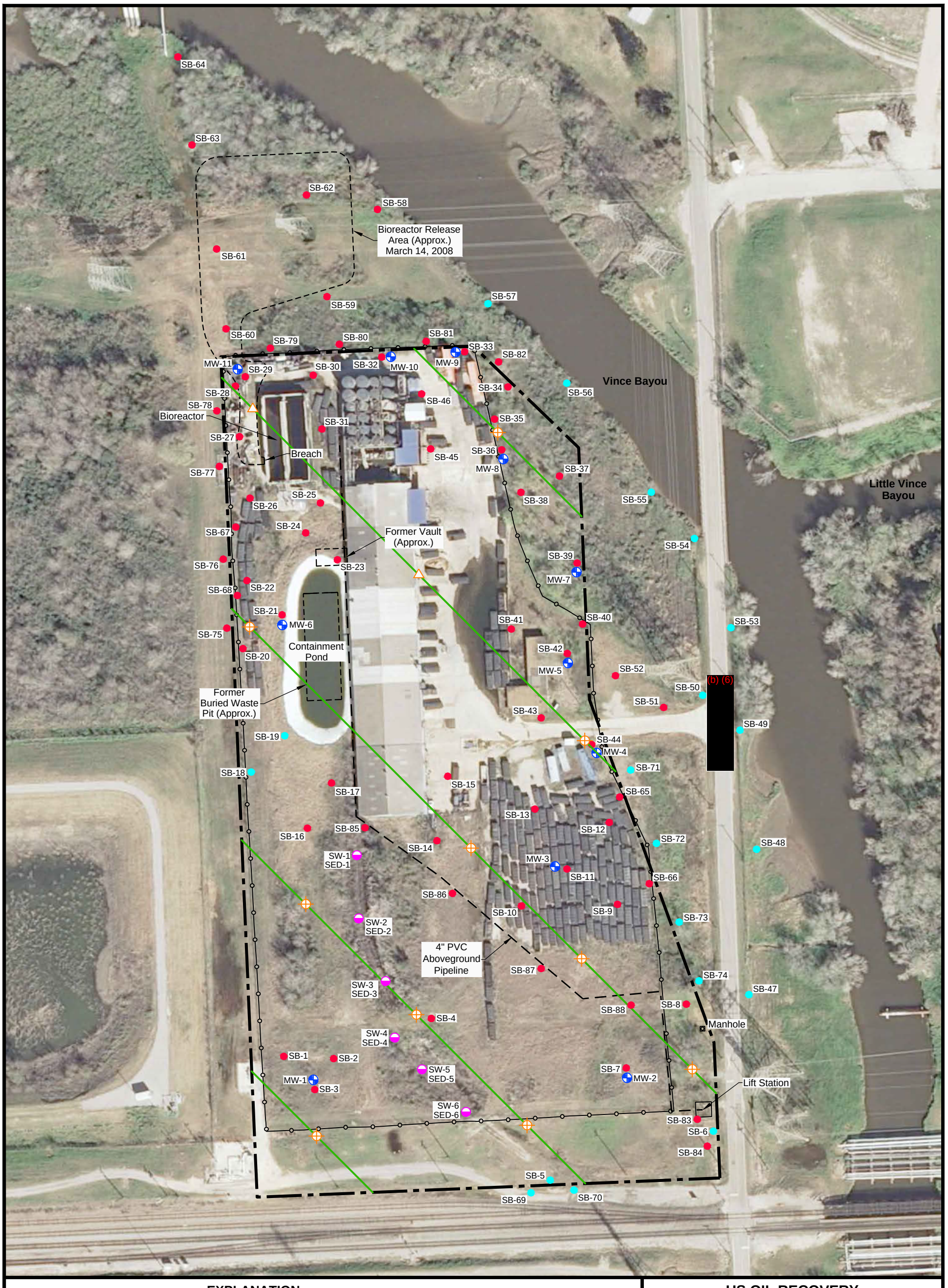

EXPLANATION

- Approx. Property Boundary
- Approx. Security Fence
- Proposed Soil Boring Location (Source Areas/Industrial Activities)
- Proposed Soil Boring Location (Drainage Areas)
- Proposed Surface Water/ Sediment Sample Location
- Proposed Monitoring Well Location
- Proposed CPT/ROST Transect Location
- Proposed CPT Location
- Proposed CPT/ROST Location

Note:
All locations are approximate and subject to change.

N

Approx. Scale in Feet

0 60 120

US OIL RECOVERY
PASADENA, TEXAS

Figure 6

AREA OF INVESTIGATION 1 PROPOSED SAMPLING LOCATIONS RI/FS ITERATION 1

PROJECT: 1863	BY: AJD	REVISIONS
DATE: APRIL, 2014	CHECKED: MKW	

PASTOR, BEHLING & WHEELER, LLC
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ATTACHMENT D-1

AREA OF INVESTIGATION 1
PROPERTY HISTORY AND SAMPLING RATIONALE

ATTACHMENT D-1 – AREA OF INVESTIGATION 1
PROPERTY HISTORY AND SAMPLING RATIONALE

This document summarizes the ownership and operational history for Area of Investigation 1 (AOI-1) at the US Oil Recovery (USOR) Superfund Site, previous and proposed removal actions at AOI-1, and a rationale for the proposed sample locations described in the Scope of Work. This information will also be included in the Remedial Investigation/Feasibility Study (RI/FS) Work Plan and is provided in this document as additional support for the investigative approach described in the Scope of Work.

GENERAL SITE INFORMATION

The USOR Property is located at 400 North Richey Street in Pasadena, Harris County, Texas, 77506 (Figure 3 of the Scope of Work). The approximately 12.2 acre property was most recently used as a used oil processing and waste treatment facility by US Oil Recovery LP (USOR LP). The facility is within a larger industrial complex in the north part of the City of Pasadena, TX. Mixed industrial/residential areas are south of the facility while Vince Bayou and the Houston Ship Channel are to the north.

An office building, security guard shack, and large warehouse (approximately 25,000 square feet in size) are present on the property. The warehouse includes a former laboratory, machine shop, parts warehouse, and a material processing area that included a filter press. Approximately 800 55-gallon drums (some in over-packs) and 212 poly totes (300-400 gallons) containing various industrial wastes are present within the warehouse. A tank farm with approximately 24 aboveground storage tanks (ASTs) containing industrial wastes located within secondary containment is located on the north end of the warehouse. A large, concrete-walled aeration basin (also called the bioreactor) is located west of the tank farm. A containment pond is located west of the warehouse and south of the aeration basin. Approximately 225 roll-off boxes fitted with precipitation covers are located on the property. An inactive rail spur enters the south-central part of the USOR Property from the south and extends north along the west side of the warehouse. A utility right-of-way with various pipelines is present within the southern part of the property and pipelines are also present outside of the property along the eastern and western sides.

The following historical operations have reportedly been conducted at the USOR Property:

- Manufacturing of arsenical, chlorate, and borate pesticide and herbicide products;
- Manufacturing of fertilizer and sulfuric acid;
- Leather tanning and cow hide exporting;
- Storage of various hard goods; and
- Used oil processing and waste treatment.

Potential On-Site Releases

This section describes potential releases from USOR Property operations that may have impacted environmental media from 2005 until late 2010. These releases are described in the HRS Documentation (EPA, 2011) for the USOR Property. If the location of a release listed below is known, it is shown on Figure D-1-1.

October 7, 2005. The TCEQ Region 12 Waste Program received a complaint that alleged USOR LP had discharged contaminated stormwater from a pipe located just outside the entrance to the property and dumped tank bottom waste into a manhole located on the southeast side of the USOR Property (Figure D-1-1). The manhole was connected to the sewer line used by USOR LP to discharge treated wastewater to the City of Pasadena. During the inspection a ditch was observed with dark colored water between (b) (6) (b) (6) and the manhole. The TCEQ investigator concluded that the water appeared to overflow from the manhole since the vegetation near the manhole was distressed. Soil samples were collected and

results showed concentrations of arsenic, lead and mercury exceeding TCEQ Commercial/Industrial Protective Concentration Limits (PCLs) for soil protective of Class 1/2 groundwater near the manhole on the southeast side of the site and at the stormwater outfall near the front gate. The analyte list included all RCRA metals, copper, nickel, zinc, BTEX compounds, and TPH. $^{Total}Soil_{Comb}$ PCLs were not exceeded for any of the compounds evaluated.. There is no indication that this release migrated past the ditch near the facility.

February 23, 2006. A TCEQ Region 12 Waste Program investigator collected soil samples near the northwest corner of the tank farm where an oil spill had occurred; at the north end of the former arsenic burial pit located to the west of the warehouse building; and in a drainage area west of the warehouse building. These samples contained concentrations of arsenic, barium, lead, mercury, several pesticides, SVOCs, and VOCs exceeding commercial/industrial PCLs. Information related to the concentrations of the compounds analyzed and which PCLs were exceeded was not included in the reference to the HRS. USOR LP reported that the oil spill near the northwest corner of the tank farm was a result of 50 to 100 gallons of liquid released onto the ground from a leaking pipeline near the containment wall. According to USOR LP, impacted soil was removed although there is no information related to the analytical testing, area of potential impact, or the removal action. The exact locations of the releases were not provided in the HRS.

December 17, 2007. TCEQ found an unauthorized discharge of wastewater onto the ground due to cracks in the west wall of the aeration basin. Six soil samples were collected: two samples from approximately three feet from the base of the basin, one sample from approximately 58 feet away at the north fence line; two samples from the adjacent downgradient property to the north; and one sample from approximately 88 feet north of the USOR Property. Arsenic, lead and mercury were measured above TRRP Tier 1 residential PCLs. Information related to the concentrations of the compounds analyzed and which PCLs were exceeded was not included in the reference to the HRS. There is no indication that this release migrated beyond the sampling point 88 feet north of the USOR Property. The exact location of the release cannot be determined because a map was not provided in the HRS for this release.

March 14, 2009. USOR LP reported that there was a release of several hundreds of gallons of hazardous waste from the west side of the bioreactors, which migrated north on the property about 150 feet and then outside of the property another 200 feet to the north (Figure D-1-1). Affected soil was excavated and disposed of off-site. No information was provided to indicate what compounds were analyzed for or how it was determined if soil was affected. There is no indication that this release migrated beyond 200 feet to the north of the USOR Property.

September 2009 through January 2010. During several site inspections, roll-off boxes, containers, and drums in the warehouse were observed to be leaking and no secondary containment was present. According to the RCRA §7003 Unilateral Administrative Order, "On December 2, 2009, EPA inspectors observed the stormwater basin overflow with the discharge going to Vince Bayou. An oily sheen was present in the off-site discharge." Several waste material samples were collected but no samples of environmental media were collected. The exact locations of the releases were not noted and a map was not provided in the HRS.

July 2, 2010. After a large rainfall, the TCEQ visited the site and discovered that it had been abandoned. The TCEQ reported the potential release of hazardous substances because numerous roll-off boxes labeled as containing hazardous waste were filled with liquid, overflowing onto the ground, and the liquid was flowing off-site. Because of the rainfall, Vince Bayou was flooded and breached (b) (6) . Because of the visual observation of uncontrolled release of liquids from the retention pond, secondary containments, and roll-off boxes labeled as containing hazardous waste, EPA initiated an Emergency

Response and Removal Action to stabilize the site and prevent further migration of site related constituents off-site. The exact locations of the releases were not noted and a map was not provided in the HRS.

November 4, 2010. The Harris County Public Health and Environmental Services (HCPHES) reported that an oily discharge was occurring from the USOR Property following a heavy rain. EPA found damaged containers in the warehouse and the overflow and off-site migration of liquids to Vince Bayou. The exact location of the release was not noted and a map was not provided in the HRS. No environmental samples were collected during this inspection.

Investigation History

According to the PA (TCEQ, 2011) and other documents, the following environmental investigations have been conducted at the USOR Property. Note that although these investigations are described in various documents and references to concentrations of various constituents are also included, sample location maps and/or actual analytical data are typically not provided in the documents. Furthermore, for many of those investigations where data are provided, the data are of limited value due to the fact that much of the data lack the required backup information such as sample location maps, quality assurance/quality control (QA/QC) data, and/or analytical method information. Data with the appropriate backup information are described in the Existing Data Evaluation section of the Scope of Work, including data summary tables and sample location maps.

1971. Over 100 soil samples were collected in the Spring of 1971 at varying depths. Sample locations were not provided. Arsenic was the only compound evaluated. Samples ranged in concentration less than 10 mg/kg to greater than 3,000 mg/kg in two samples.

1973. According to Progress Report No. 2 Dated October 3, 1973 and associated laboratory reports for several sampling events, water samples were collected in various tanks, a sump pit, and other locations; and soil samples were collected mostly from the west side of the warehouse building (but also in other locations as noted in the laboratory reports). It appears that this work was done in order to focus the areas where excavation would be conducted.

October 30, 1991. A Phase 2A Environmental Site Assessment (ESA) was prepared for Covesud S.A. by Espey, Huston & Associates (EH&A) which described the investigation of a below-grade concrete vault that was located west of the warehouse (Figure D-1-1). Soil and groundwater samples were collected from three borings. Arsenic and several pesticides were measured in soil and groundwater from all three borings while groundwater and soil samples collected at one boring also contained various organic constituents that appeared to be solvent and resin-related compounds.

November 14, 1991. EH&A completed a Phase 2B ESA for Covesud S.A. to further investigate the area near the concrete vault. A below-grade pit (tank) was also discovered within the warehouse. Samples were analyzed for arsenic and copper, VOCs, SVOCs, TPH, and pesticides. Soil and groundwater samples collected from these additional borings associated with the vault contained elevated levels of arsenic, copper and pesticides. The contents of the tank were sampled and indicated the presence of arsenic and copper but not the other analytes.

October 7, 1992. TWC issued a NOV for unauthorized discharge after becoming aware of soil and groundwater contamination at the USOR Property. Specifically, the NOV states, “Analytical results from soil and groundwater samples collected from the above-referenced site indicate a high concentration of arsenic, and high level of total petroleum hydrocarbons, and the presence of several pesticide and organic solvent constituents.”

December 4, 1995. Seven surface soil samples were collected by Environmental Remedies, Inc. and analyzed for TCLP metals and three water samples were collected from three concrete pits containing water and wastewater from prior industrial use as part of this investigation. All samples were analyzed for TCLP metals, VOCs, and SVOCs. Sample locations were not provided although the report indicates they are contained in an appendix to the report. The soil samples indicated the presence of barium and lead at levels below TCLP hazardous criteria. Composite samples from concrete wastewater pit 1 indicated the presence of mercury and several VOCs and SVOCs. Barium, cadmium, chromium and lead were identified in the water sample from pit 2. No results or summary information were provided for pit 3 other than a statement that this was "an outside pit that measures 8' x 10' and is nothing more than a water gathering pit adjacent to a water valve/fire hydrant."

March 2, 1998. Twenty discrete surface soil samples were collected at the west side of the storage warehouse. The soil sample locations occurred beginning approximately 50 feet north of the former vault area and heading south on 50 foot centers. Arsenic concentrations ranged from the detection limit to 190 mg/kg. According to the report from Extra Environmental, Inc. dated March 2, 1998, the data indicated three areas of potential impact with 1) the highest concentrations analyzed occurred north of the former vault area; 2) the second area located south of the former vault area and adjacent to the former warehouse; and 3) the third area located south of the former vault area and west of the former warehouse.

June 24 through July 17, 2001. Soil and groundwater samples were collected throughout the USOR Property by EFEH & Associates as part of an Environmental Site Assessment for Arsenic in Groundwater and Soil on behalf of Mr. Decker McKim of ReMax Southeast. The report, dated August 27, 2001, indicates that the rail spur that ran along the rear of the warehouse has been removed. The current occupants were using the property to store appliances and church storage. Samples were analyzed for arsenic only. Of the 25 soil samples, only one had measured concentrations greater than 200 mg/kg and none of the groundwater samples collected from the boreholes exceeded 0.05 mg/L. The one soil sample with arsenic measured at 219 mg/kg was taken from the center of the pit on the west side of the warehouse (Figure D-1-1). On January 14, 2002, the Corrective Action Section requested additional information and submittal of an Affected Property Assessment Report (APAR).

May 16, 2002. An APAR was prepared and sent to the TCEQ by Mr. Decker McKim on behalf of Hide Exporters of Texas. It appears that this report re-packaged the data that was collected during the summer of 2001 (and submitted at that time as an Environmental Site Assessment by EFEH & Associates). TCEQ issued a notice of deficiency on August 29, 2002 requesting a revised report to fulfill the Agency reporting requirements and further information related to the use of the critical PCL for arsenic of 200 mg/kg. On March 20, 2003, the TCEQ requested additional information after reviewing a response letter dated December 26, 2002 related to the critical PCL used in the evaluation since 18 soil samples exceeded the soil to groundwater PCL of 2.5 mg/kg. In addition, this letter asked that the synthetic precipitate leaching procedure (SPLP) test be performed on soil samples.

April 2003. Twenty-nine additional soil and 10 additional groundwater samples were collected and analyzed for arsenic as documented in a submittal to the TCEQ on May 6, 2003. The dimensions of the arsenic waste pit were delineated by the additional boreholes. The submittal provided information related to the impervious nature of the highly compact silty clay underlying the property and results of the SPLP test. On August 18, 2003, the TCEQ gave conditional approval of the APAR: the soil assessment phase was deemed to be complete but additional information related to groundwater was requested.

September 15, 2003. Additional information was submitted by the property owner related to analytical data from samples collected on September 3, 2003 from the groundwater monitoring wells; and recorded

deed notices, TRRP Deed Notice and Industrial Solid Waste Deed Notice of Waste Disposal for the arsenic pit, which was left in place at that time.

October 7, 2005. TCEQ Region 12 Waste Program investigator collected three samples of surface soil from an area of distressed vegetation located near a manhole on the southeast side of the USOR Property and analyzed the samples for BTEX, TPH and inorganic compounds. Results showed concentrations of arsenic, lead and mercury exceeding TCEQ Commercial/Industrial PCLs for soil protective of Class 1/2 groundwater near the manhole on the southeast side of the property and at the stormwater outfall near the front gate. It should be noted that $^{Tot}Soil_{Comb}$ PCLs were not exceeded for any of the compounds evaluated, and that the analyte list included all RCRA metals, copper, nickel, zinc, BTEX compounds, and TPH. There is no indication that this release migrated past the ditch near the facility.

February 23, 2006. A TCEQ Region 12 Waste Program investigator collected soil samples near the northwest corner of the tank farm where an oil spill had occurred; at the north end of the former arsenic burial pit located to the west of the warehouse building; and in a drainage area west of the warehouse building. These samples contained concentrations of arsenic, barium, lead, mercury, several pesticides, SVOCs, and VOCs exceeding commercial/industrial PCLs. TCEQ recommended the following corrective action: the horizontal and vertical extent of contamination must be determined, provisions under TRRP must be applied, and an APAR and Remedial Action Plan (RAP) should be submitted. Information related to the concentrations of the compounds analyzed and which PCLs were exceeded was not included in the reference to the HRS. USOR LP reported that the oil spill near the northwest corner of the tank farm was a result of 50 to 100 gallons of liquid released onto the ground from a leaking pipeline near the containment wall. According to USOR LP, impacted soil was removed although there is no information related to the analytical testing, area of potential impact, or the removal action. The exact locations of the releases were not provided in the HRS.

December 17, 2007. TCEQ Region 12 Waste Program investigator collected six soil samples after observing a leak in the aeration basin. Two soil samples were collected approximately three feet from the basin; one soil sample was collected approximately 58 feet away at the north fence line; one sample was taken approximately 88 feet north of USOR Property; and two soil samples were collected on the adjacent down-gradient property to the north. The two samples collected on the adjacent down-gradient property to the north contained petroleum hydrocarbons at levels that required remediation. All six soil samples contained arsenic, lead, and/or mercury exceeding TCEQ TRRP Tier 1 residential PCLs. Information related to the concentrations of the compounds analyzed and which PCLs were exceeded was not included in the reference to the HRS. There is no indication that this release migrated beyond the sampling point 88 feet north of the USOR Property. The exact location of the release cannot be determined because a map was not provided in the HRS for this release.

October 12, 2009. Letter sent by USOR LP reporting completion of remediation activities following a March 14, 2009 release of waste from the aeration basin. Results of confirmation samples collected and analyzed for metals, VOCs, and SVOCs were submitted to TCEQ. Arsenic concentrations off-site were elevated but USOR LP indicated that the bioreactors did not contain arsenic-bearing material since they do not receive arsenic-bearing waste at the facility.

ATTACHMENT D-1 – AREA OF INVESTIGATION 1
PROPERTY HISTORY AND SAMPLING RATIONALE

Removal/Response Actions

This section describes removal or remedial actions that have occurred at the facility based on available documents. In addition, proposed remedial actions by the PRP group are provided. Additional actions may be necessary pending the results of the RI.

Property Owner Actions

December 7, 1973. In a progress report from Rhodia Inc., Chipman Division dated December 7, 1973 related to actions required following a court hearing, a removal action consisting of the removal of 5,000 cubic yards of arsenic-contaminated soil from an area on the west side of the warehouse building (what is now the tank farm) was completed. The contaminated soil was disposed of on-property and treated with lime to immobilize the arsenic. Based on a September 1973 drawing, the borrow pits are located on the southwest portion of the property.

1990. Contaminated soil was removed and placed in an on-site pit on the west side of the warehouse and mixed with lime to form calcium arsenate and thus render it insoluble in water. This is later called the arsenic waste pit.

September 22, 2003. USOR LP removed 1,608 cubic yards of arsenic waste and soil from a buried waste pit on the west side of the warehouse. This material was disposed of off-site. On October 10, 2003, the TCEQ approved the waste removal report. On October 17, 2003, the TCEQ indicated to Hide Exporters of Texas that TRRP Remedy Standard A had been achieved for this area and no post-response action care was needed. This letter addresses two reports that are not in the PA (TCEQ, 2011 or HRS documentation) – Groundwater Sampling and Institutional Control Report dated September 15, 2003 and Groundwater Sampling Report dated September 26, 2003.

July 21, 2005. Sixty cubic yards of soil was excavated near a manhole and ditch associated with surface water discharge from USOR Property. This excavation was reported by USOR LP to be in response to a request from the City of Pasadena Fire Marshal after a paint spill occurred on (b) (6) . USOR LP employees indicated that the October 2005 incident involving the manhole and an alleged release was a result of Vince Bayou flooding and then becoming stagnant in the excavated areas that were now lower-lying than the rest of the general area.

Letter from USOR LP dated March 2, 2006. USOR LP reported that, on or during a TCEQ inspection on January 10, 2006, 50 to 100 gallons of liquid was released onto the ground from a leaking pipeline near the containment wall by Tank 3. Impacted soil was removed although there is no information related to the analytical testing, area of potential impact, or the removal action.

Letter from USOR LP dated October 12, 2009. Following a release of hazardous waste from the west side of the bioreactors, which migrated north on the property about 150 feet and then outside of the USOR Property another 200 feet to the north, USOR LP initiated response actions that included removing liquids by vacuum truck and removal of about 3 inches of soil by dozer, backhoe and hand excavation from the affected areas. 115 cubic yards of soil was disposed of off-site in the Fort Bend Landfill. Confirmation samples were collected and analyzed for metals, VOCs, and SVOCs to confirm that site remediation objectives (Tier 1 Commercial/Industrial Soil PCLs) had been met within one week following a March 14, 2009 release of waste from the aeration basin. Arsenic concentrations off-site were elevated but USOR LP indicated that the bioreactors did not contain arsenic-bearing material since they do not receive arsenic-bearing waste at the facility.

ATTACHMENT D-1 – AREA OF INVESTIGATION 1
PROPERTY HISTORY AND SAMPLING RATIONALE

EPA Lead

August 2, 2010. EPA completed its Emergency Response and Removal at the site, which included securing and inventorying 225 roll-off boxes, 797 drums, and 212 poly totes and disposing of approximately 392,000 gallons of non-hazardous material off-site.

November 4, 2010. Following a heavy rain and observing damaged containers in the warehouse leaking and migrating off-site, EPA recovered approximately 410,000 gallons of non-hazardous oily liquid waste from the north and south secondary containment (tank farm) areas, sumps and bays, and parking lot. In addition, nine vacuum boxes of non-hazardous sludge waste and four vacuum boxes of hazardous sludge removed from various tanks were disposed of off-site. EPA personnel completed the emergency response on December 20, 2010.

PRP Removal Actions

The PRP Group is in the process of implementing a series of removal actions to address some of the potential source areas on the USOR Property. These removal actions are being performed pursuant to the Removal Action AOC dated August 25, 2011. Specific removal action scopes were described in addenda to the Site Stabilization and Monitoring Work Plan submitted in accordance with the Removal Action AOC requirements. Work Plan Addendum No. 1, dated April 20, 2012, described the approach and procedures for removal and off-site disposal of liquids and solids from the bioreactor followed by bioreactor demolition. The bioreactor liquids were removed in accordance with this addendum in the summer of 2012. Subsequent sampling of the bioreactor solids indicated that due to the characteristics of those materials a different removal approach would be needed. Work Plan Addendum No. 2, dated July 29, 2013, provided the approach and procedures for removal and off-site disposal of the bioreactor solids and other containerized materials, including liquids and solids in the 225 roll-off boxes associated with the former USOR LP operations. Removal of the roll-off box liquids has been performed. Removal of bioreactor and roll-off box solids is currently underway. The discharge of approximately 600,000 gallons of water from the containment pond to Vince Bayou was performed in December 2013 in accordance with an authorization from the EPA and TCEQ. Additional discharges from the pond may be performed, as warranted. Future removal actions are intended to address the contents of the aboveground storage tanks (and associated sumps and containment areas and totes/drums within the warehouse.

SAMPLING RATIONALE

SOIL SAMPLE LOCATIONS

On-property and off-property soil sample locations (Figure 6 of the Scope of Work) and information relied upon to determine sampling locations is presented below. This information is based on review of historic Site documents, historic aerial photographs (attached), and reconnaissance observations at the USOR Property.

Soil samples will be collected to evaluate the lateral and vertical extent of constituents of potential concern (COPCs) in soils. Soil sample collection intervals would be based on location specific information (i.e., deeper samples collected from “source” or “process related” areas and shallower samples collected from surface water run-off areas) and are anticipated to include one or more of the following intervals; surface soil (0 to 0.5 ft bgs), shallow soils (0.5 to 5 ft bgs), and subsurface soil (greater than 5 ft bgs) as described in the Scope of Work.

Preliminary soil sample locations are subject to revision based on the data and information collected during RI/FS Work Plan preparation and/or during the field investigation.

ATTACHMENT D-1 – AREA OF INVESTIGATION 1
PROPERTY HISTORY AND SAMPLING RATIONALE

On-Property Soil Boring Location Rationale

Sample Location	Sample Location Rationale
SB-1	Railroad spur loading/unloading pad observed in the 1944 aerial photograph (attached).
SB-2,3	Lack of vegetation in this area on aerial photographs such as 1978, as well as text in historic reports regarding burial of arsenic contaminated soils in this general location.
SB-4	Disturbed soil based on 2004 and 2008 aerial photographs.
SB-7	Disturbed soils on the southeastern portion of the property based on 2004 aerial photograph.
SB-9,10,11, 65, 66	Southeastern tank/roll-off box storage area used for the temporary containment of waste material.
SB-12	Disturbed soils along the eastern property boundary based on 1944 aerial photograph and location of tank/roll-off box storage area used for the temporary containment of waste material.
SB-13	Disturbed soils on the south-central portion of Site based on 2004, 2005, and 2007 aerial photographs; and location of tank/roll-off box storage area used for the temporary containment of waste material.
SB-14	Stockpiled equipment on the southeast corner of the warehouse based on 2005 aerial photograph.
SB-15	Equipment staging area east of the machine shop based on 2005 aerial photographs.
SB-16	Soil sample collected in 2001 with elevated arsenic concentration.
SB-17	Stockpiled material west of the machine shop and south of the containment basin based on 1978, and 2006 aerial photographs.
SB-18	Drainage ditch enters the property from the western property based on the 1944 aerial photograph.
SB-19	Drainage ditch extending from the western property dead ends at the railroad tracks, west of the warehouse, based on the 1953 aerial photograph.
SB-20, 67, 68	Northwestern property boundary adjacent to the containment pond and in the vicinity of the tanks/roll-off boxes used for the temporary containment of waste material.
SB-21	Immediately west of the containment pond.
SB-22	Possible stockpiled material located to the west of the warehouse based on the 1978 aerial photograph, possible stockpiled material located to the west of the containment pond in the 2006 aerial photograph, and location of tanks/roll-off boxes used for the temporary containment of waste material.
SB-23	Underground vault and run-off area west of the warehouse in numerous aerial photographs.
SB-24	Five cylindrical and four square tanks/pits west of the warehouse based on the 1953 aerial photograph, soil disturbance west of the warehouse based on the 1989 aerial photograph, drainage path extending north from containment pond observed in the 2005 aerial photograph, and stockpiled material north of the containment pond as observed in the 2006 aerial photograph.
SB-25	Soil sample collected on 1998 with elevated arsenic concentration.
SB-26	Drainage path extends north from the pit/pad in 1995 aerial photograph, bare soil along the northwestern property boundary based on 2002 aerial photograph, stockpiled material in the 2004 aerial photograph, and location of tanks/roll-off boxes used for the temporary containment of waste material.
SB-27	West of the bioreactors where tanks/roll-off boxes used for the temporary containment of waste material.
SB-28	Bare soil areas along the northwestern Site property boundary based on 2002 aerial

	photograph.
SB-29	Surface water drainage path away from bioreactors, based on Site reconnaissance observations.
SB-30	Bare soil area in the 2005 and 2007 aerial photographs, north of the containment pond, and tanks/roll-off boxes used for the temporary containment of waste material.
SB-31	Stockpiled material west of the AST area in the 1978 and 2004 aerial photographs, northwestern Site property boundary and around the aeration basin, and tanks/roll-off boxes used for the temporary containment of waste material.
SB-32	Bare soils north of the ASTs based on the 2007 aerial photograph.
SB-33	Bare soil on the north property boundary on 1953 aerial photograph, stockpiled material on the northeast corner of the Site based on 2004 aerial photograph, and tanks/roll-off boxes used for the temporary containment of waste material.
SB-40	Bare soil that appears to receive runoff from the gravel parking area north of the entrance road, based on the 2007 aerial photograph.
SB-41	Surface water accumulation area that drains to the east, just northwest of the office building, based on visual observations and aerial photographs (e.g., 2011).
SB-42	Disturbed soils along the east boundary in the 1944 aerial photograph, and surface water drainage path observed during Site reconnaissance.
SB-43	Disturbed soil south of office building as observed in the 1944 aerial photograph.
SB-44	Surface water drainage area along southern entrance road based on reconnaissance observations (see 2011 aerial photograph)
SB-45	Adjacent and southeast of AST loading/unloading area (see 2007 aerial photograph).
SB-46	Adjacent and northeast of AST loading/unloading area (see 2007 aerial photograph)
SB-85	Adjacent to aboveground pipeline
SB-86	Adjacent to aboveground pipeline
SB-87	Adjacent to aboveground pipeline
SB-88	Adjacent to aboveground pipeline

ATTACHMENT D-1 – AREA OF INVESTIGATION 1
PROPERTY HISTORY AND SAMPLING RATIONALE

Off-Property Soil Boring Location Rationale

SB-5	Storm water appears to enter the property at this location from the south, based on aerial photographs and property visit visual observations.
SB-6	Storm water drainage ditch west of (b) (6) at southeast property boundary.
SB-8	Soil sample next to manhole where TCEQ observed discharge on 10/7/2005 and collected soil samples that were measured with elevated arsenic concentrations.
SB-34	Disturbed soil at the northeast corner of the property based on the 1989 aerial photograph.
SB-35	Drainage from earthen/gravel parking area east of the warehouse based on the 2002 aerial photograph.
SB-36	Drainage from parking area east of the AST area based on 2008 aerial photograph, and tanks/roll-off boxes used for the temporary containment of waste material.
SB-37	Bare soil adjacent and east-northeast of sludge bed based on 1953 aerial photograph and historical USOR Property drawings.
SB-38	Sludge bed on the northeast corner of the property based on the 1953 aerial photograph.
SB-39	Bare soil that appears to receive runoff from the gravel parking area north of the entrance road, based on the 2007 aerial photograph.
SB-47	Storm water drainage ditch east of (b) (6).
SB-48	Surface water discharge point into Vince Bayou.
SB-49	Storm water drainage ditch east of (b) (6), east of the entrance drive.
SB-50	Storm water drainage ditch west of (b) (6) and north of the entrance drive.
SB-51	Bare soil north of the entrance road, between (b) (6) and the entrance gate, based on the 2004 aerial photograph.
SB-52	Gravel parking area north of the entrance road to the property, prior to entering the property, based on the 2005 aerial photograph.
SB-53	Storm water drainage ditch east of (b) (6)
SB-54	Storm water drainage ditch west of (b) (6), where surface water discharges into Vince Bayou.
SB-55	Storm water drainage northeast of the property, where surface water discharges into Vince Bayou.
SB-56	Surface water discharge into Vince Bayou.
SB-57	Surface water discharge into Vince Bayou.
SB-58	Bare soil disturbance north of the property based on 1953 aerial photograph.
SB-59	Storm water run-off from material stockpiled on northern portion of property based on 1978 aerial photograph.
SB-60	Soil sample collected on 12/17/2007 where TCEQ observed run-off from a release at the bioreactor.
SB-61	Stockpiled material north of the property boundary in the 1978 aerial photograph and bare soil area north of property based on 2004 aerial photograph.
SB-62	Bare earthen area north of Site based on 2004 aerial photograph.
SB-63	Bare earthen area north of Site based on 2004 aerial photograph.
SB-64	Bare earthen area north of Site based on 2004 aerial photograph.
SB-69	Storm water appears to enter the property at this location from the south, based on aerial photographs and property visit visual observations.
SB-70	Storm water appears to enter the property at this location from the south, based on aerial photographs and property visit visual observations.
SB-71	Adjacent to location of tank/roll-off box storage area used for the temporary containment of waste material.
SB-72	Adjacent to location of tank/roll-off box storage area used for the temporary containment

	of waste material.
SB-73	Adjacent to location of tank/roll-off box storage area used for the temporary containment of waste material.
SB-74	Adjacent to location of tank/roll-off box storage area used for the temporary containment of waste material.
SB-75	Adjacent to the containment pond and in the vicinity of the tanks/roll-off boxes used for the temporary containment of waste material.
SB-76	Adjacent to the containment pond and in the vicinity of the tanks/roll-off boxes used for the temporary containment of waste material.
SB-77	Adjacent to the containment pond and in the vicinity of the tanks/roll-off boxes used for the temporary containment of waste material.
SB-78	Adjacent to the containment pond and in the vicinity of the tanks/roll-off boxes used for the temporary containment of waste material.
SB-79	Adjacent to bioreactor and tank area
SB-80	Adjacent to bioreactor and tank area
SB-81	Adjacent to bioreactor and tank area
SB-82	Adjacent to tanks/roll-off boxes used for the temporary containment of waste material and in area of drainage away from parking lot
SB-83	Adjacent to lift station on Southeast corner of property
SB-84	Adjacent to lift station on Southeast corner of property

MONITOR WELL SAMPLE LOCATIONS

Presented below is a description of on-property and off-property monitor well locations (Figure 6 of the Scope of Work) based on review of historic documents, historic aerial photographs, and reconnaissance observations. Monitor wells will be completed within the corresponding soil boring.

Preliminary monitor wells sample locations are subject to revision based on the data and information collected during RI/FS Work Plan preparation and/or during the field investigation.

Sample Location	**Sample Location Rationale**
MW-1 (SB-3)	Southwestern corner of the property where a lack of vegetation and notes in reports reference burial of arsenic impacted soils. Assumed to be hydraulically up-gradient of the main operational area.
MW-2 (SB-7)	Southeastern corner of the property where disturbed soils were observed. Assumed to be hydraulically up-gradient of the main operational area.
MW-3 (SB-11)	Southeastern portion of the property where tanks/roll-off boxes are used for the temporary containment of waste material. Assumed to be hydraulically up-gradient of the main operational area.
MW-4 (SB-44)	Surface water drainage area along southern property entrance road based on reconnaissance observations. Assumed hydraulically down-gradient of warehouse maintenance area.
MW-5 (SB-42)	Near the east-central property boundary, northeast of the office where a soil disturbance was noted and adjacent to a surface water drainage path extending from the concrete truck staging area. Assumed to be hydraulically down-gradient of the warehouse maintenance area.
MW-6 (SB-21)	West of the containment pond where historic excavation was performed. Assumed to be hydraulically up-gradient of operational area.
MW-7 (SB-39)	Bare soil that appears to receive runoff from the gravel parking area north of the entrance road, based on the 2007 aerial photograph. Assumed hydraulically down-

	gradient of warehouse container storage area and containment pond.
MW-8 (SB-36)	Drainage from parking area east of the AST area based on 2008 aerial photograph, and tanks/roll-off boxes used for the temporary containment of waste material. Assumed hydraulically down-gradient of AST areas.
MW-9 (SB-33)	Near the northern property boundary in areas of bare soil disturbances and where tanks/roll-off boxes are used for the temporary containment of waste material. Assumed to be hydraulically down-gradient of the main AST area.
MW-10 (SB-32)	Bare soils north of the ASTs based on the 2007 aerial photograph. Assumed to be hydraulically down-gradient of the main AST area.
MW-11 (SB-29)	Surface water drainage path away from bioreactor, based on reconnaissance observations. Assumed hydraulically down-gradient of the bioreactor.

SURFACE WATER AND SEDIMENT SAMPLE LOCATIONS

Presented below is a description of on-property surface water and sediment sample locations (Figure 6 of the Scope of Work) based on review of historic documents, historic aerial photographs, and reconnaissance observations.

Preliminary surface water and sediment sample locations are subject to revision based on the data and information collected during RI/FS Work Plan preparation and/or during the field investigation.

Sample Location	**Sample Location Rationale**
SW-1 SED-1, SED-2, SED-3	Former railroad spur area in southwest central portion of Site. Observed to retain water based on reconnaissance.
SW-2, SED-4, SED-5,SED-6	Former railroad spur area in south central portion of Site. Observed to retain water based on reconnaissance.

As indicated in the Scope of Work, off-property sediment and surface water sample locations will be determined based on the information obtained during on-property soil, groundwater, surface water and sediment sampling and off-property soil and groundwater sampling.

REFERENCES

Texas Commission on Environmental Quality (TCEQ), 1997. Impacts of Point and Nonpoint Sources on Vince Bayou and Little Vince Bayou Segment 1007 of the Houston Ship Channel. Prepared by Greg Conley. Field Operations Division. AS-130/SR. May 1997 (document indicates 1977 but based on the Commissioners and TNRCC letterhead and date of data presented, it is believed that the document is from 1997).

Texas Commission on Environmental Quality (TCEQ), 2011. Preliminary Assessment Report. US Oil Recovery, LLC. Pasadena, Harris County, Texas. TXR000051540. April.

U.S. Environmental Protection Agency (EPA), 2011. Hazard Ranking System (HRS) Documentation Record. US Oil Recovery. Site Spill Identifier No.: A6X7. Cerclis Site ID No. TXN000607093. September.

EXPLANATION

- Approx. Property Boundary
- Approx. Security Fence

N

Approx. Scale in Feet

0 60 120

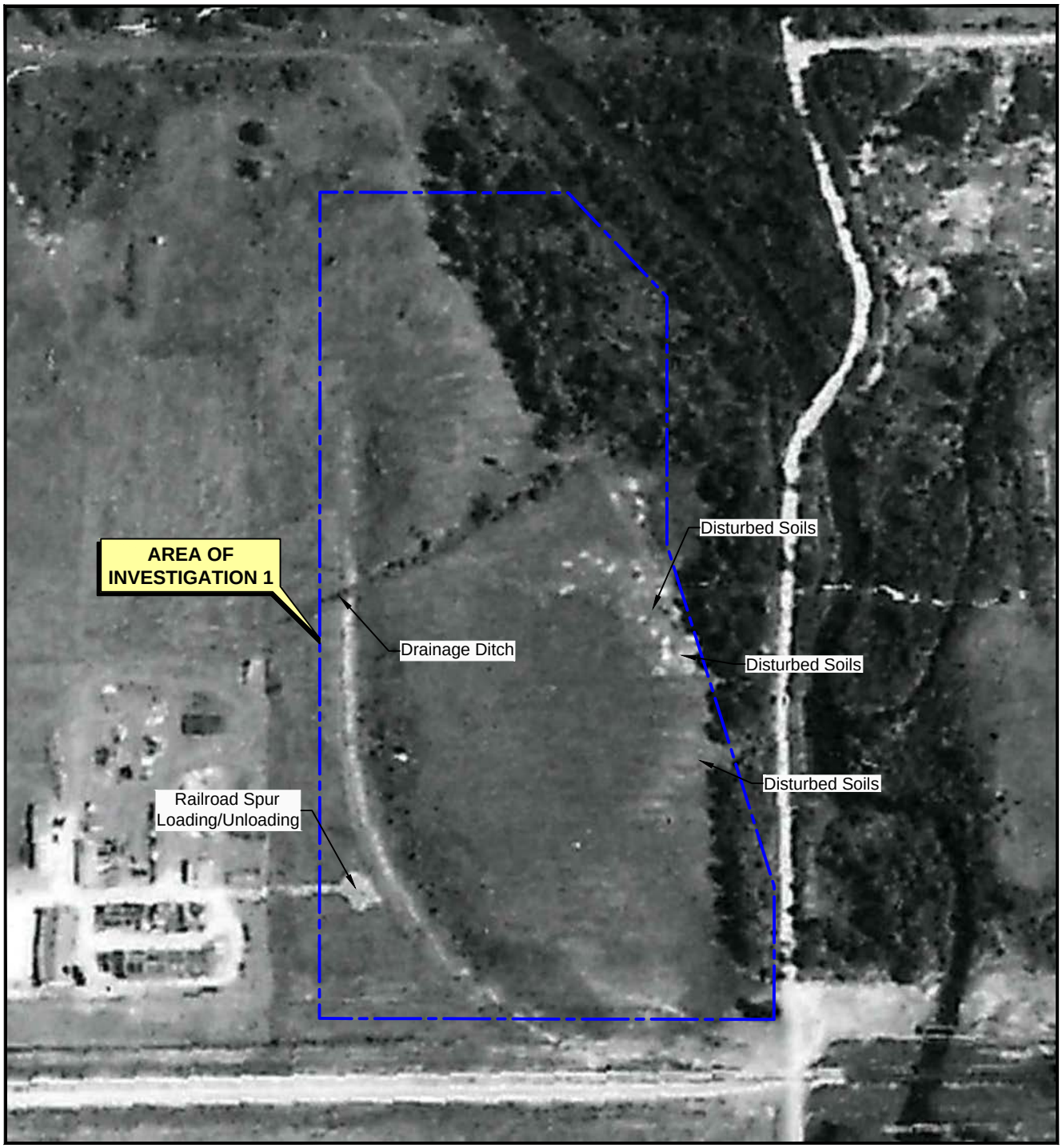
Source:
Houston-Galveston Area Council, April 2012 Image, 2012 Aerial Imagery Data is the sole property of Houston-Galveston Area Council, which reserves all rights thereto. Use or reproduction of this data is strictly prohibited absent written consent from the Houston-Galveston Area Council.

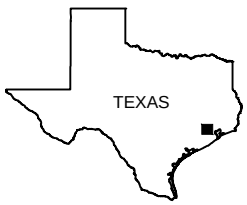
US OIL RECOVERY
PASADENA, TEXAS

Figure D-1-1
USOR PROPERTY
AREA OF INVESTIGATION 1 (AOI-1)
LOCATIONS OF HISTORIC RELEASES AND INVESTIGATIONS

PROJECT: 1863	BY: AJD	REVISIONS
DATE: APRIL, 2014	CHECKED: MKW	

PASTOR, BEHLING & WHEELER, LLC
CONSULTING ENGINEERS AND SCIENTISTS





AERIAL PHOTO LOCATION

N

Approx. Scale In Feet

0 100 200

SOURCE:
Base map from Google Earth, dated December 1944.

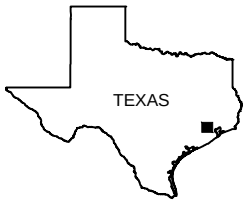
US OIL RECOVERY
PASADENA, TEXAS

Figure D-1-2

1944 AERIAL PHOTOGRAPH

PROJECT: 1863	BY: AJD	REVISIONS
DATE: APRIL, 2014	CHECKED: MKW	

PASTOR, BEHLING & WHEELER, LLC
CONSULTING ENGINEERS AND SCIENTISTS



AERIAL PHOTO LOCATION

N

Approx. Scale In Feet

0 100 200

SOURCE:
Base map from Google Earth, dated December 1953.

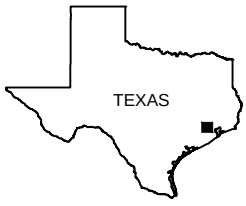
US OIL RECOVERY
PASADENA, TEXAS

Figure D-1-3

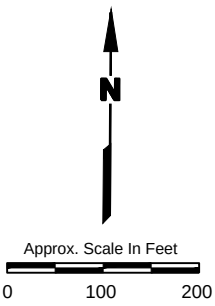
1953 AERIAL PHOTOGRAPH

PROJECT: 1863	BY: AJD	REVISIONS
DATE: APRIL, 2014	CHECKED: MKW	

PASTOR, BEHLING & WHEELER, LLC
CONSULTING ENGINEERS AND SCIENTISTS



AERIAL PHOTO LOCATION



SOURCE:
Base map from EDR Report dated August 13, 2012, Pasadena, TX.

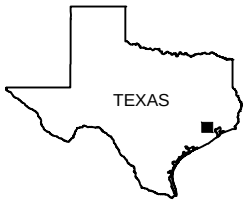
US OIL RECOVERY
PASADENA, TEXAS

Figure D-1-4

1953 AERIAL PHOTOGRAPH

PROJECT: 1863	BY: AJD	REVISIONS
DATE: APRIL, 2014	CHECKED: MKW	

PASTOR, BEHLING & WHEELER, LLC
CONSULTING ENGINEERS AND SCIENTISTS



AERIAL PHOTO LOCATION

N

Approx. Scale In Feet

0 100 200

SOURCE:
Base map from EDR Report dated August 13, 2012, Pasadena, TX.

US OIL RECOVERY
PASADENA, TEXAS

Figure D-1-5

1962 AERIAL PHOTOGRAPH

PROJECT: 1863	BY: AJD	REVISIONS
DATE: APRIL, 2014	CHECKED: MKW	

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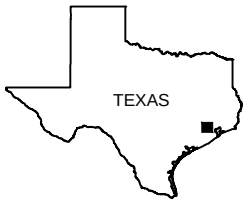
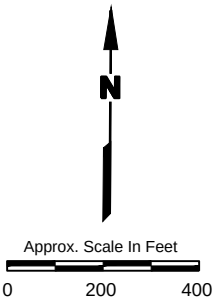
CONSULTING ENGINEERS AND SCIENTISTS



AERIAL PHOTO LOCATION



SOURCE:
Base map from Google Earth, dated December 1978.

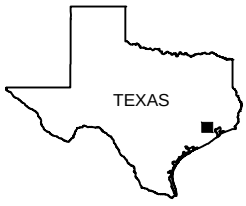
US OIL RECOVERY
PASADENA, TEXAS

Figure D-1-6

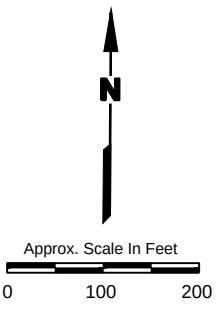
1978 AERIAL PHOTOGRAPH

PROJECT: 1863	BY: AJD	REVISIONS
DATE: APRIL, 2014	CHECKED: MKW	

PASTOR, BEHLING & WHEELER, LLC
CONSULTING ENGINEERS AND SCIENTISTS



AERIAL PHOTO LOCATION



SOURCE:
Base map from EDR Report dated August 13, 2012, Pasadena, TX.

US OIL RECOVERY
PASADENA, TEXAS

Figure D-1-7

1979 AERIAL PHOTOGRAPH

PROJECT: 1863	BY: AJD	REVISIONS
DATE: APRIL, 2014	CHECKED: MKW	

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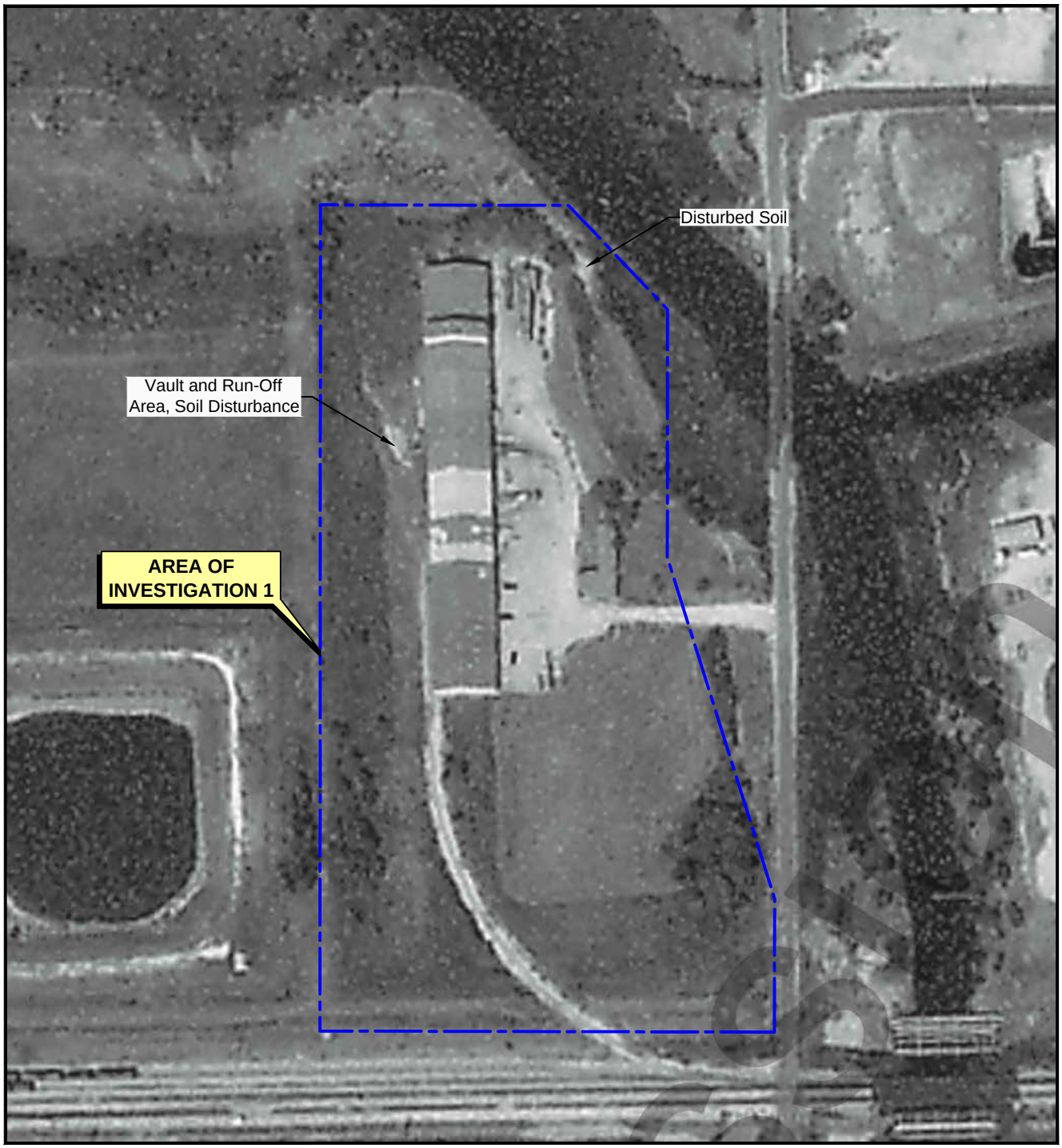

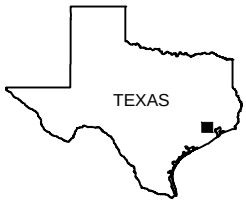

AERIAL PHOTO LOCATION

N

Approx. Scale In Feet

0 100 200

SOURCE:
Base map from EDR Report dated August 13, 2012, Pasadena, TX.

US OIL RECOVERY
PASADENA, TEXAS

Figure D-1-8

1989 AERIAL PHOTOGRAPH

PROJECT: 1863	BY: AJD	REVISIONS
DATE: APRIL, 2014	CHECKED: MKW	

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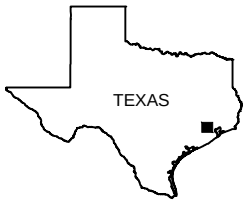

AERIAL PHOTO LOCATION

N

Approx. Scale In Feet

0 100 200

SOURCE:
Base map from Google Earth, dated January 1995.

US OIL RECOVERY
PASADENA, TEXAS

Figure D-1-9

1995 AERIAL PHOTOGRAPH

PROJECT: 1863	BY: AJD	REVISIONS
DATE: APRIL, 2014	CHECKED: MKW	

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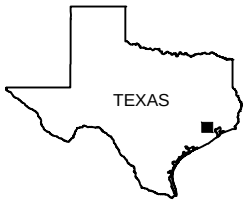

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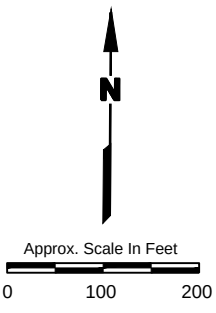

SOURCE:
Base map from EDR Report dated August 13, 2012, Pasadena, TX.

US OIL RECOVERY
PASADENA, TEXAS

Figure D-1-10

1995 AERIAL PHOTOGRAPH

PROJECT: 1863	BY: AJD	REVISIONS
DATE: APRIL, 2014	CHECKED: MKW	

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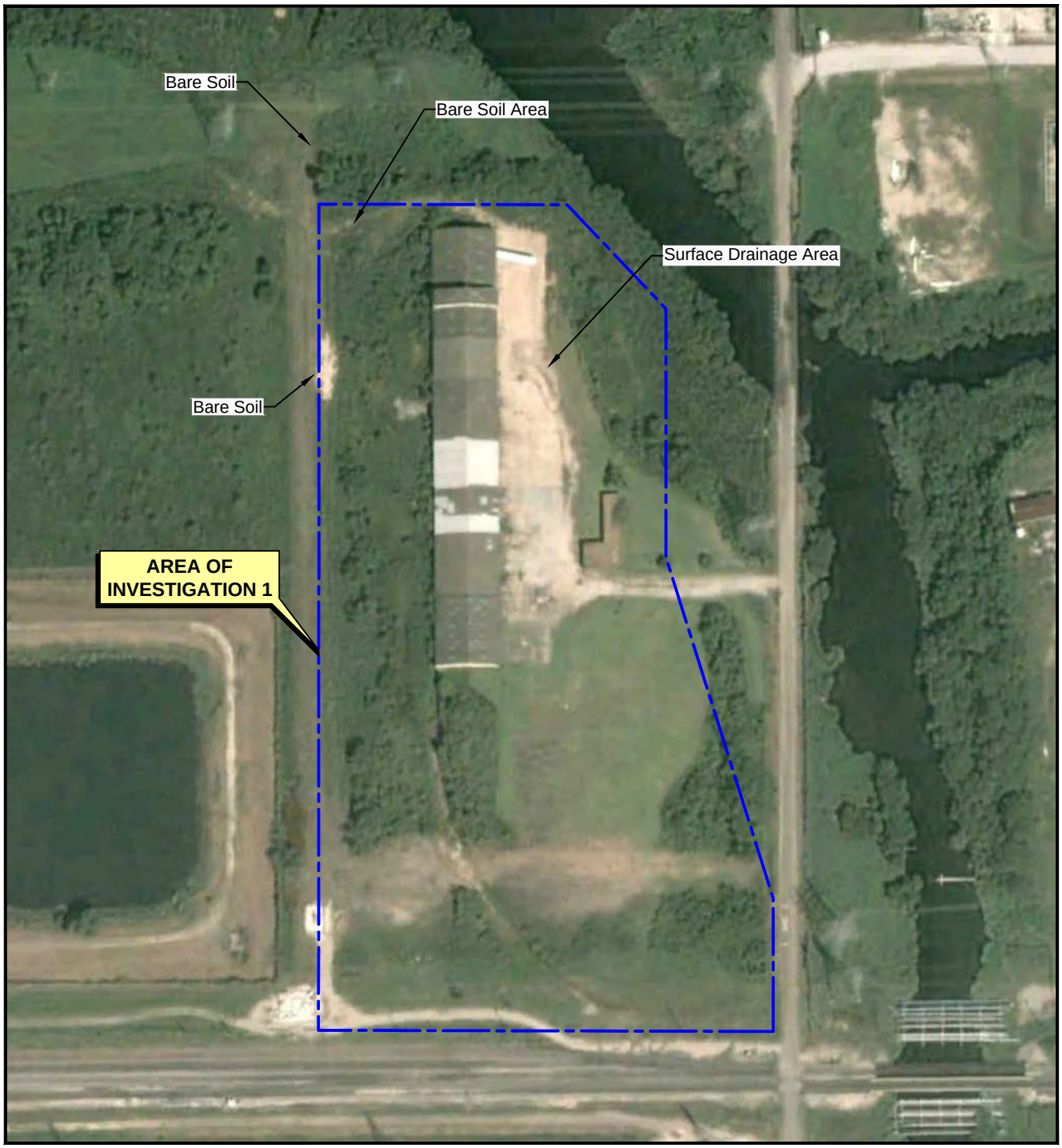
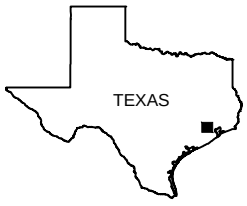
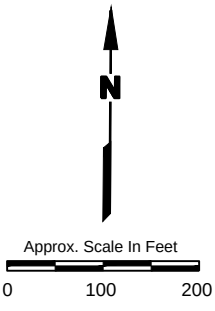
CONSULTING ENGINEERS AND SCIENTISTS





AERIAL PHOTO LOCATION



SOURCE:
Base map from Google Earth, dated October 2002.

US OIL RECOVERY
PASADENA, TEXAS

Figure D-1-11

2002 AERIAL PHOTOGRAPH

PROJECT: 1863	BY: AJD	REVISIONS
DATE: APRIL, 2014	CHECKED: MKW	

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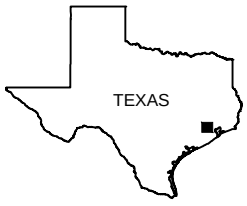
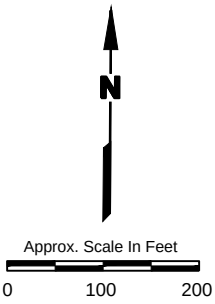


AERIAL PHOTO LOCATION



SOURCE:
Base map from Google Earth, dated February 2004.

US OIL RECOVERY
PASADENA, TEXAS

Figure D-1-12

2004 AERIAL PHOTOGRAPH

PROJECT: 1863	BY: AJD	REVISIONS
DATE: APRIL, 2014	CHECKED: MKW	

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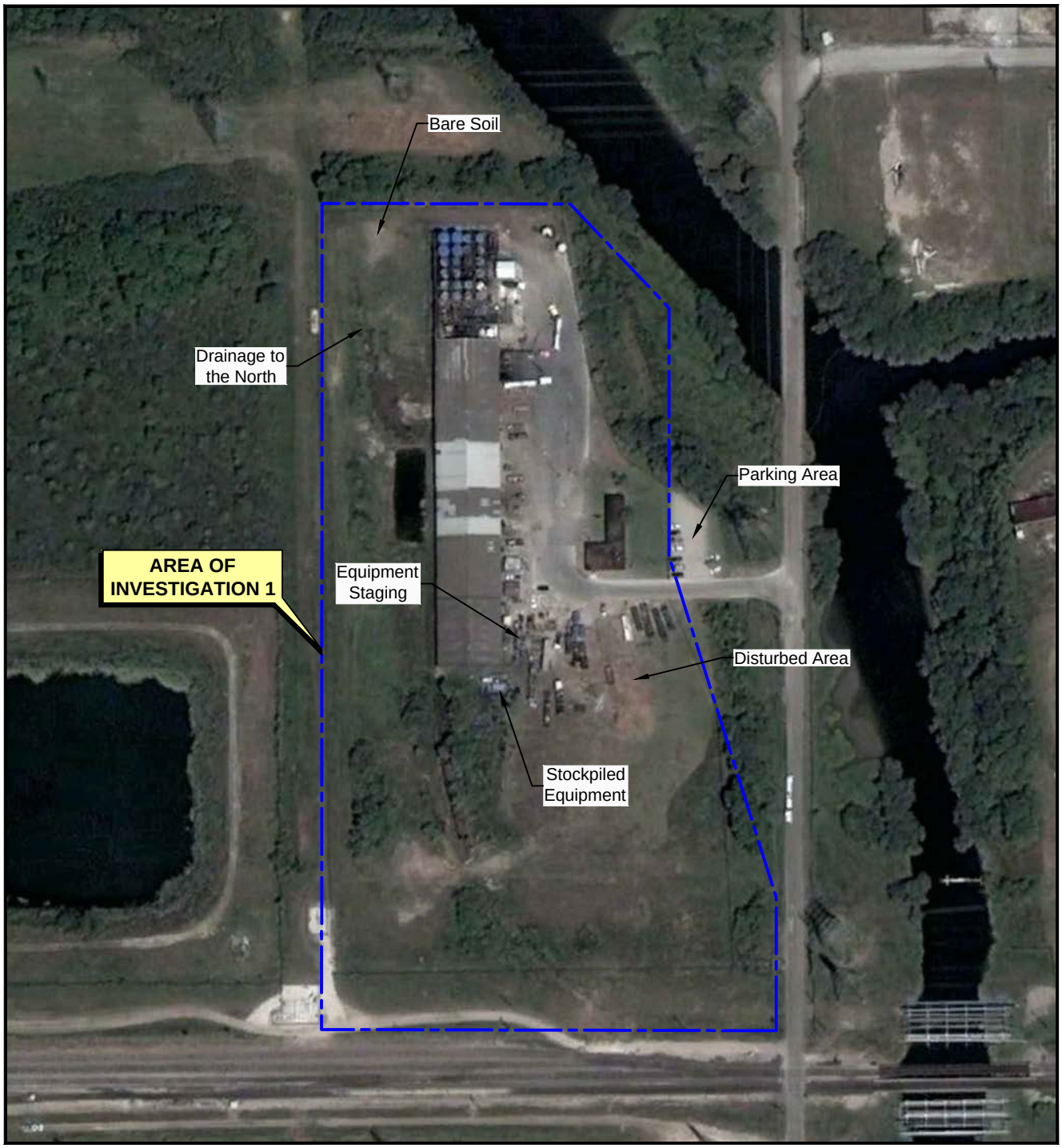

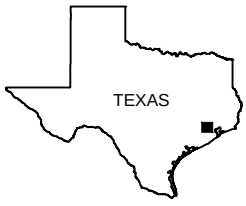

AERIAL PHOTO LOCATION

N

Approx. Scale In Feet

0 100 200

SOURCE:
Base map from Google Earth, dated April 2005.

US OIL RECOVERY
PASADENA, TEXAS

Figure D-1-13

2005 AERIAL PHOTOGRAPH

PROJECT: 1863	BY: AJD	REVISIONS
DATE: APRIL, 2014	CHECKED: MKW	

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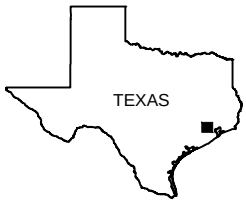
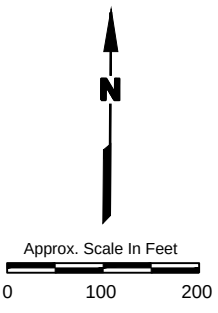


AERIAL PHOTO LOCATION



SOURCE:
Base map from Google Earth, dated January 2006.

US OIL RECOVERY
PASADENA, TEXAS

Figure D-1-14

2006 AERIAL PHOTOGRAPH

PROJECT: 1863	BY: AJD	REVISIONS
DATE: APRIL, 2014	CHECKED: MKW	

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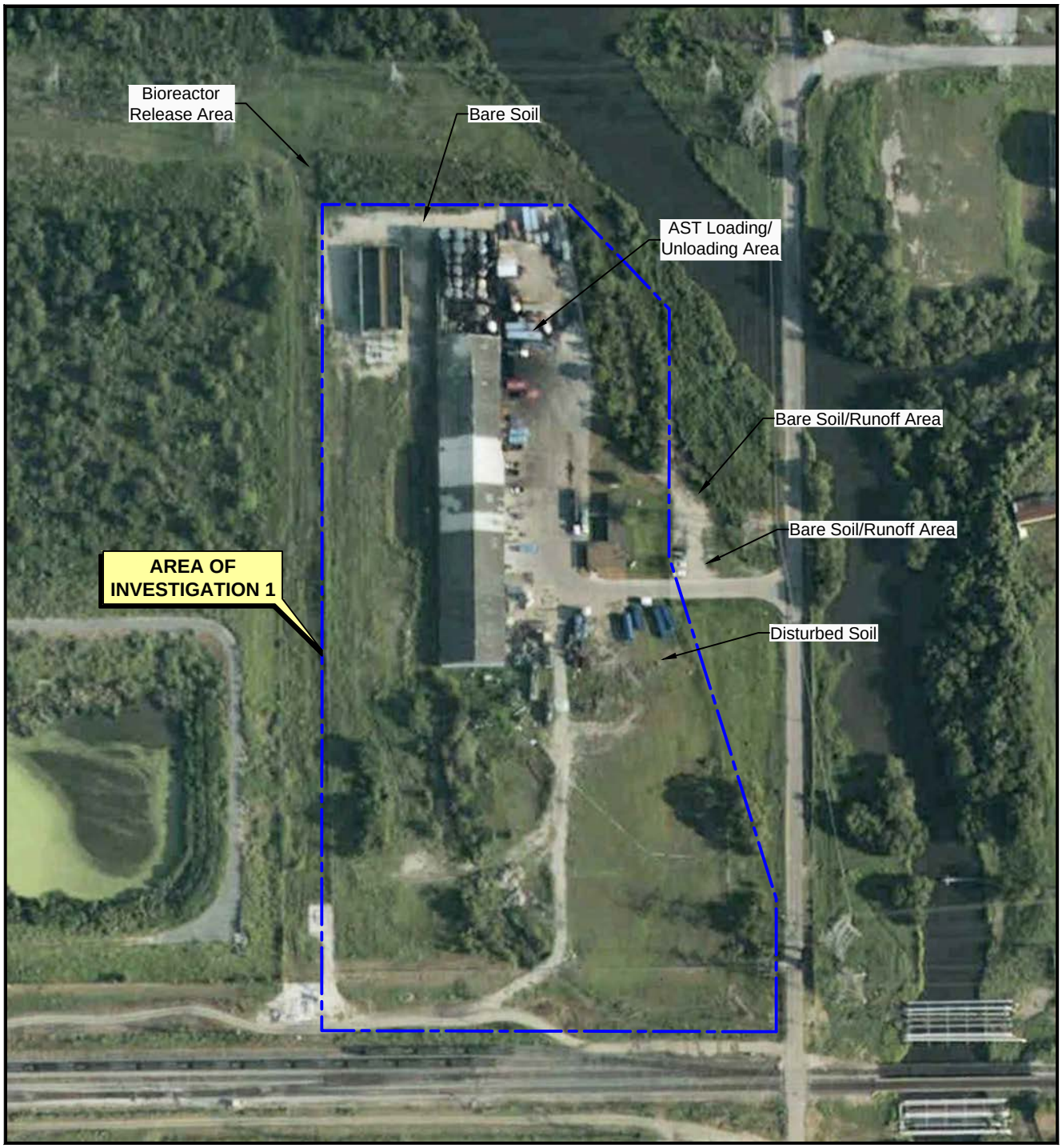
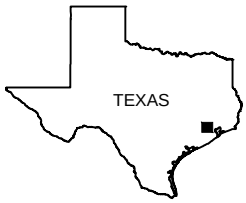
CONSULTING ENGINEERS AND SCIENTISTS





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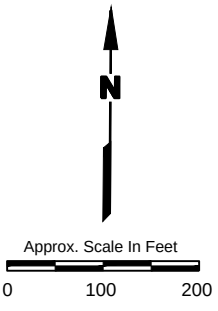

SOURCE:
Base map from Google Earth, dated September 2007.

US OIL RECOVERY
PASADENA, TEXAS

Figure D-1-15

2007 AERIAL PHOTOGRAPH

PROJECT: 1863	BY: AJD	REVISIONS
DATE: APRIL, 2014	CHECKED: MKW	

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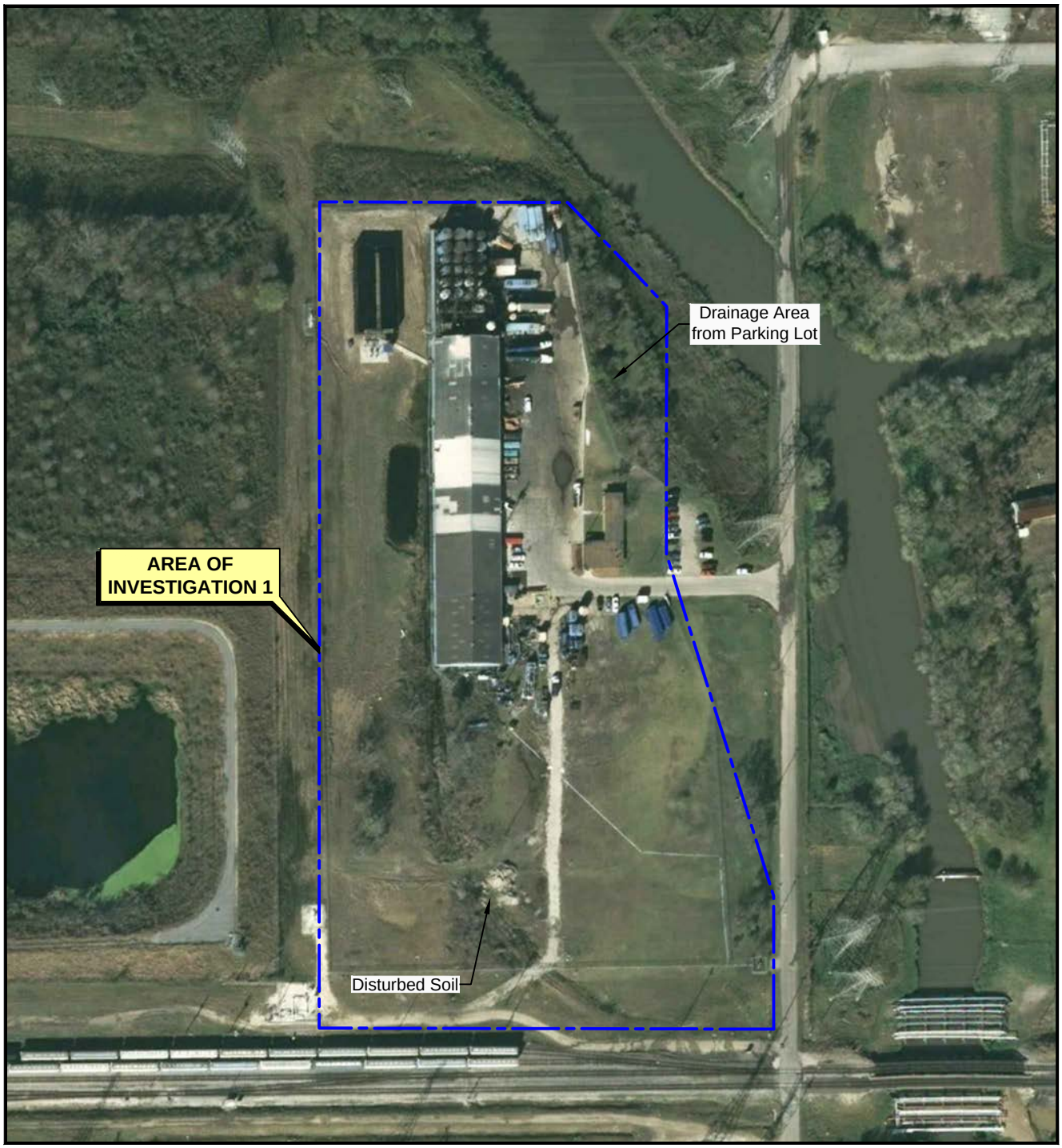
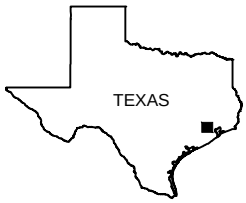
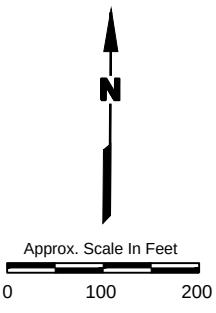




AERIAL PHOTO LOCATION



SOURCE:
Base map from Google Earth, dated January 2008.

US OIL RECOVERY
PASADENA, TEXAS

Figure D-1-16

2008 AERIAL PHOTOGRAPH

PROJECT: 1863	BY: AJD	REVISIONS
DATE: APRIL, 2014	CHECKED: MKW	

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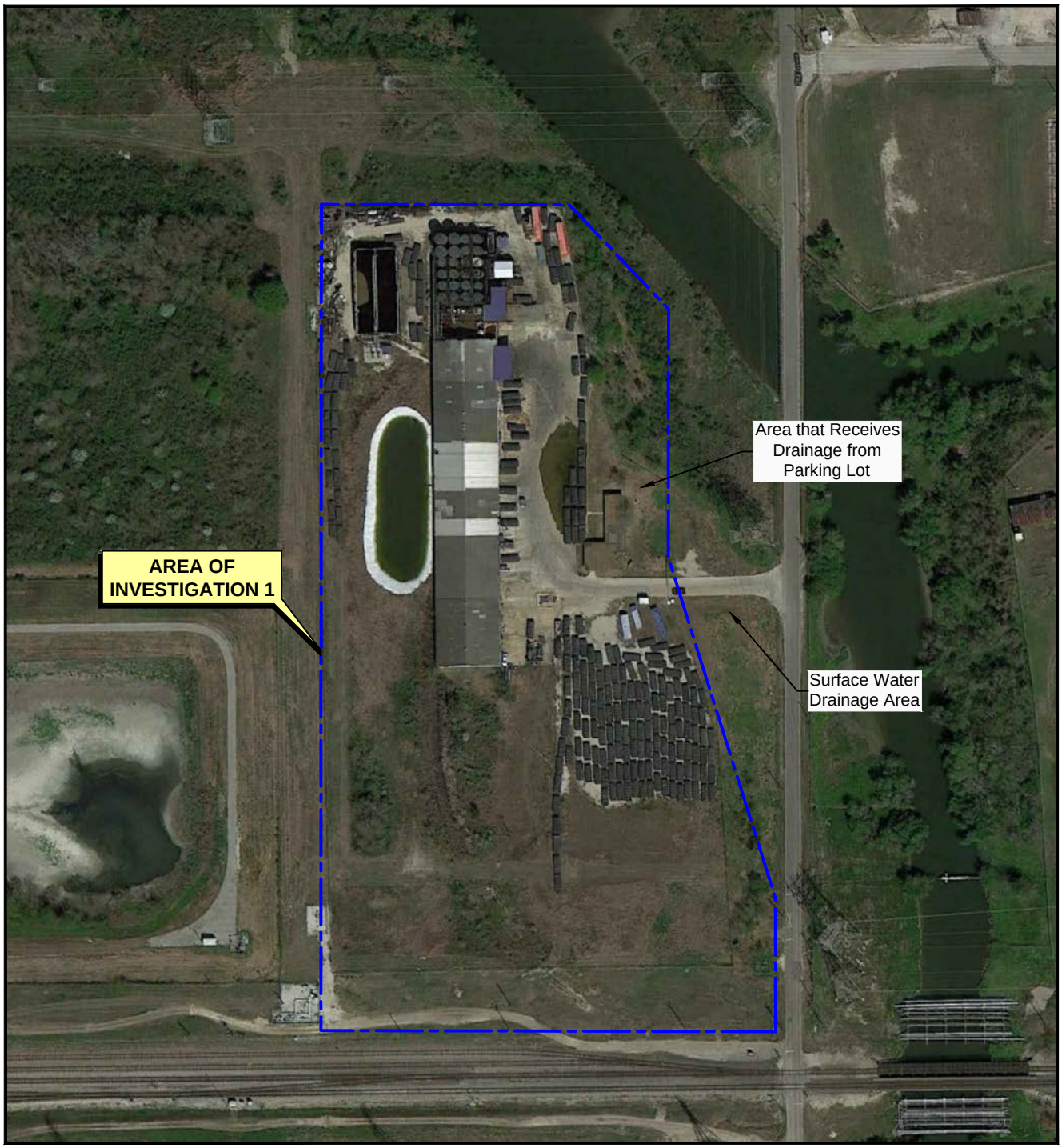

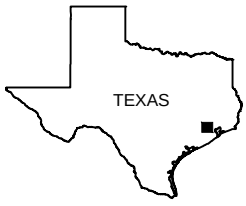

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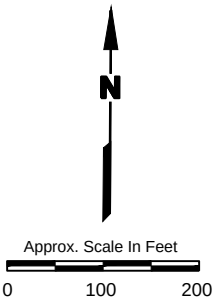

SOURCE:
Base map from Google Earth, dated March 2012.

US OIL RECOVERY
PASADENA, TEXAS

Figure D-1-17

2011 AERIAL PHOTOGRAPH

PROJECT: 1863	BY: AJD	REVISIONS
DATE: APRIL, 2014	CHECKED: MKW	

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